VOLUME XXXVIII Established 1914 NUMBER 6

CHEMICAL INDUSTRIES

JUNE, 1936

Consulting Editors

Robert T. Baldwin
L. W. Bass
Frederick M. Becket
Benjamin T. Brooks
J. V. N. Dorr
Charles R. Downs
William M. Grosvenor
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CHEMICAL INDUSTRIES is published monthly by Chemical Markets, Inc. WILLIAMS HAYNES, *President*; H. H. ADAMS, *Vice-President*; WILLIAM F. GEORGE, *Secretary-Treasurer*.

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Just Published — SEND FOR IT!

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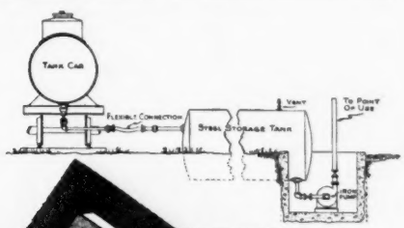
UNLOADING AND HANDLING



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Cutting Costs with Liquid Caustic Soda

FREE TO PLANT EXECUTIVES AND TECHNICAL MEN

The Table of Contents page, reproduced above, gives an idea of how comprehensive is the data in this new 72-page handbook.

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The MATHIESON ALKALI WORKS (Inc.), 60 East 42nd St., New York, N. Y.

The Reader Writes:—

"Swat the Fly"

CHEMICAL INDUSTRIES could render a great service to many of its readers if they would run an article or two regarding insects which infest drug and chemical manufacturing concerns, and methods of their control. All of these industries, regardless of the products which they manufacture, are more or less potential breeding places for certain insects.

Saegertown, Pa. C. M. GWIN, Entomologist, Baldwin Labs., Inc.

A "Bread-and-Butter" Letter

Publicity, such as is given in the interview with H. R. Drackett on "A Five Year Plan" on page 505 of your May issue, of the results of the nostrums which are being forced upon us is what this country needs most today. Then it is up to we manufacturers to put this information in such shape that our employees will really understand just how it is affecting their bread and butter.

We have already thanked Mr. Drackett for his contribution to the cause and would like to know if we can secure reprints to pass along where we think they will do real good.

Buffalo, N. Y. C. M. DE FOREST, Sales Manager, Sowers Manufacturing Co.

Whole Hog—Or None

CHEMICAL INDUSTRIES contains nothing but valuable information. He who does not read it all loses much.

Chicago, Ill. H. J. SCHWIEBERT, Illinois Central Railroad.

Why the Qualification?

I find your paper 100 per cent. interesting, especially for a research chemist in charge of production.

Ansonia, Conn. MEYER L. FREED.

"It's a Gift"

I always read the editorials, which seem to me very sound economics. The feature articles are nearly always informative and timely. The abstracts on New Products and Processes are necessary to anyone in chemical industry. Always read abstracts on Plant Operation and Administration. This is my line. I cannot understand how the staff has been able to make such improvement in the magazine as has been done in the last three years.

So. Plainfield, N. J. GEORGE E. DANALD.

Thirty-six to One Odds

I am reading regularly thirty-six chemical periodicals in several languages, but there is not one which gives me the diversified, well-planned and usable information that CHEMICAL INDUSTRIES does. I read the editorials because it broadens one's outlook and understanding; the feature articles because they are well written and constructive; the abstracts on New Products and Processes, because they not only keep me up to date, but they also assist me in research and commercial developments; abstracts on Plant Operation and Administration because they are essential to every executive; the news, because nowadays one must be well and quickly informed in order not to fall behind; U. S. Patents, because their excellent presentation enables me to find what I want in the minimum possible time; prices and market trends, because all research and commercial programs must have dollars and cents for its basis.

Cambridge, Mass. NICHOLAS L. KALMAN, A. D. Little, Inc.

With Hesitancy

The writer agrees with your critics who claim the utterance of your editor's personal political opinion on the title page of an industrial magazine, to be improper, to say the least. For this reason I subscribe with hesitance for another year.

Menlo Park, Cal. T. D. SCHWARTZ, Cook Labs.

There's More Than One Maker

The very excellent article on Phthalic Anhydride by C. R. Caryl, of American Cyanamid, in your current (May) issue is marred, to my way of thinking, by the impression that it creates that there is but a single manufacturer of this growingly important material. It is a pity that such an interesting and well rounded article should be in this way made lopsided and to Monsanto at least, as the truly pioneer manufacturer of phthalic in the United States, some proper recognition ought to have been given.

Washington, D. C. WILLIAM E. HOWARD.

The Paper Experts' Verdict

Congratulations on the composite article by the twelve paper experts. This is a ten strike. It is intensely interesting reading and very illuminating.

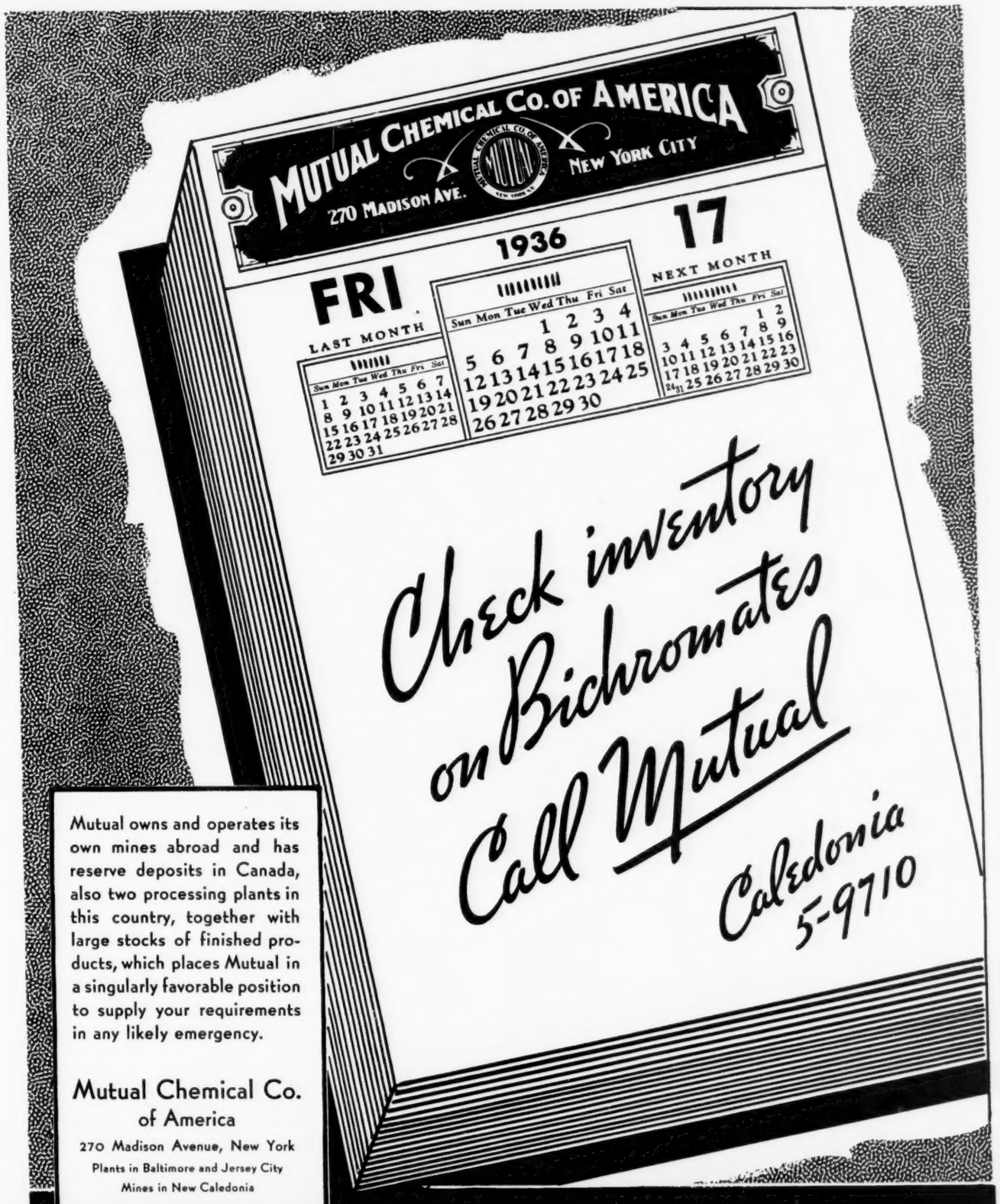
Were these paper technologists afraid to come out and say exactly what they think about chemical service or did they simply miss a point that certainly is of very great importance to all of us who sell chemicals? One of these is the great amount of technical and engineering services which chemical companies are now called upon to render to their consumers. While the paper industry is not the worst offender in this respect, nevertheless many big paper companies have received many thousands of dollars of expert advice of this kind.

From the point of view of the chemical sales company, this has reached a stage where I am frank to confess that it becomes almost "unfair competition" on the part of the larger and better equipped chemical companies. On the other hand, I wonder if some of the larger chemical consumers who tend to employ their own chemists and have their own laboratories, do not feel that this free service on the part of chemical suppliers puts their own smaller competitors on a more equal footing with them and from their point of view also tend to become "unfair competition."

This question of technical service and the companion crime of reciprocity selling are two comparatively new elements in chemical selling, the results of which do not seem to me to be altogether advantageous if we look far enough into the future.

Thank you again for this article from the paper technologists. I hope you will get similar articles in other consuming industries. It is this sort of thing that makes CHEMICAL INDUSTRIES our favorite chemical magazine.

White Plains, N. Y. ROBERT E. LOOMIS.



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C. P. Acids	Zinc Sulphate	Sal Soda
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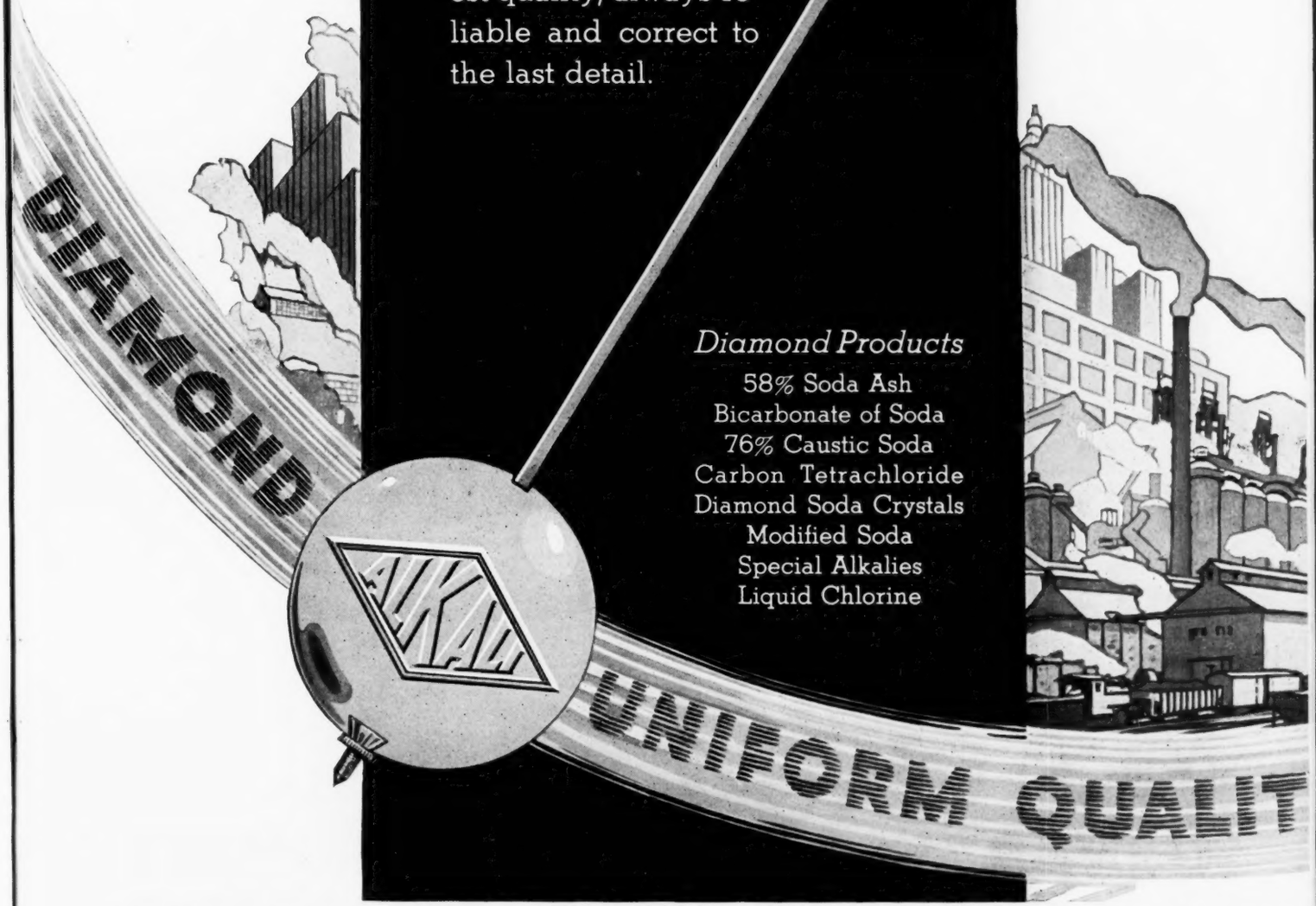

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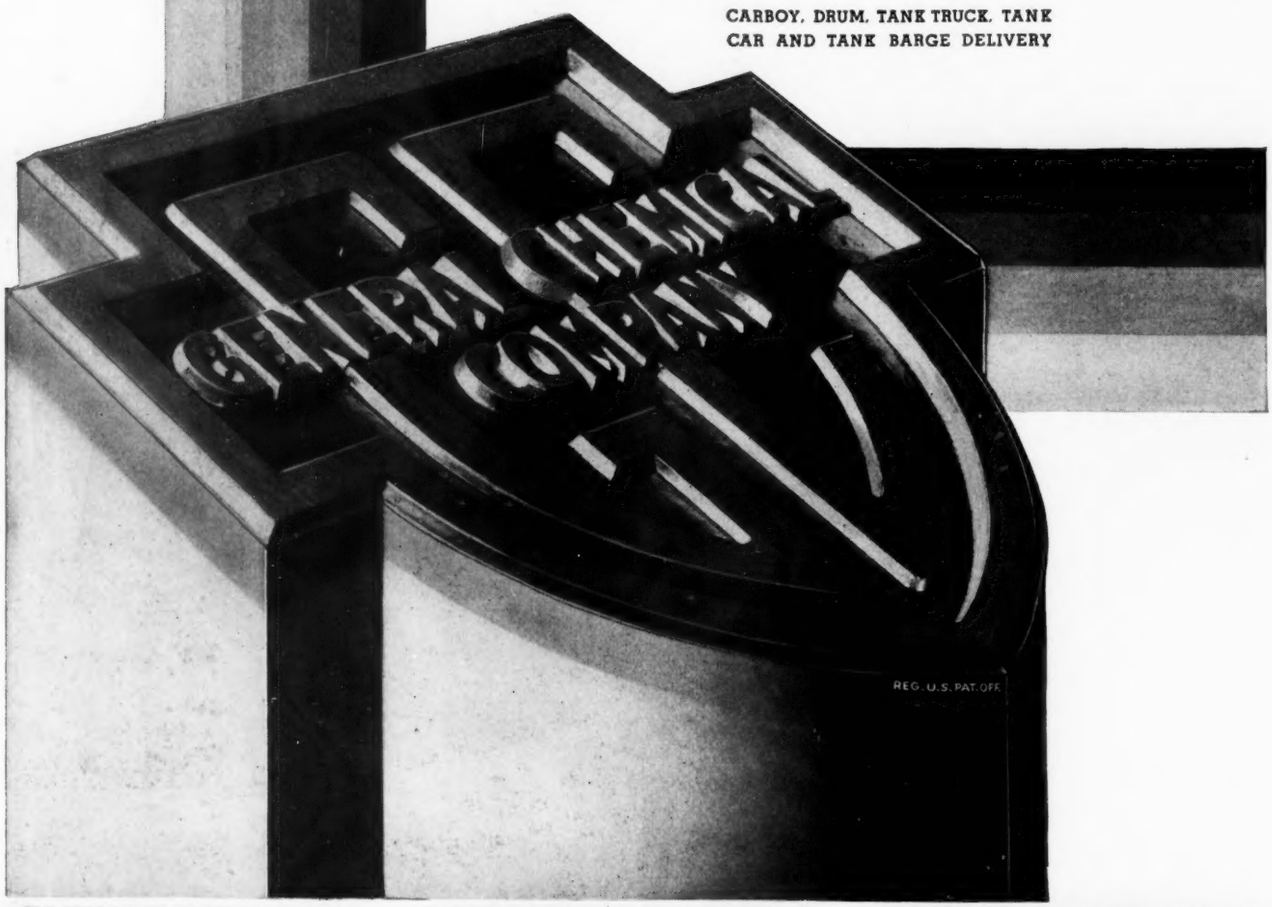

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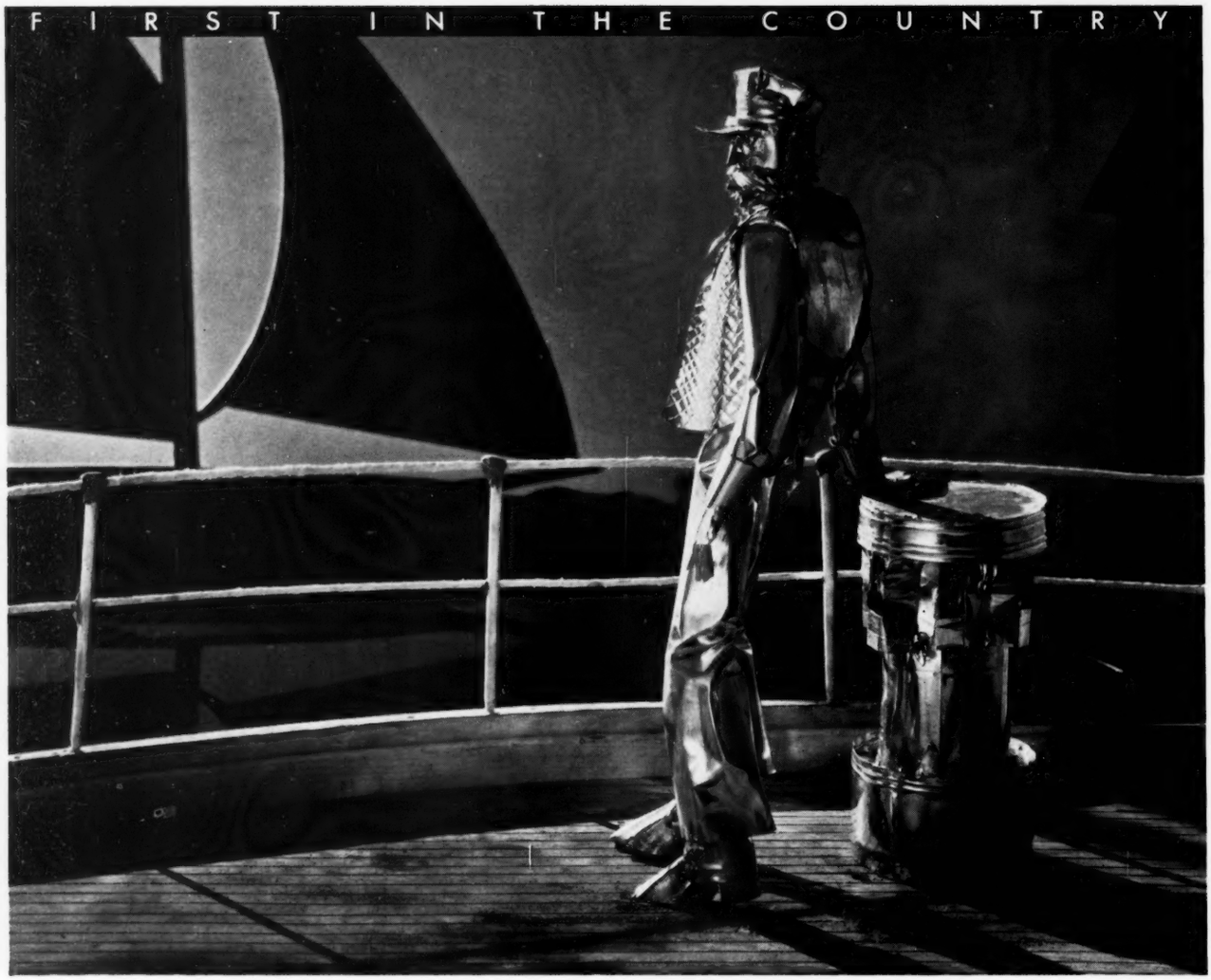

SCULPTURED IN TIN BY L. L. BALCOM

UP and down the old Mississippi ranged the hustling packet ships of the last mid-century. Their captains found trade where trade had never been known before... and helped to build a vast inland empire of commerce. Just so in our modern mid-century is EBG building progress where progress was only imagined before. By ranging the frontiers of industry it is continually discovering new uses for that valuable product, Liquid Chlorine; revealing new methods and processes that open up a new empire of industrial activity, new opportunities for profit. In matters pertaining to Liquid Chlorine put your trust in EBG — pioneer producer of the product in America.

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Precise laboratory control makes it, keeps it uniformly exact to specifications

"STANDARD" Always a good silicate specification..

In other words, you have only to tell us the characteristics required of Silicate of Soda in your process (or let us help you to determine them). Then sit back and enjoy life, with the assurance that every shipment of "Standard" will be uniformly correct in all details, and dependably prompt in delivery as well. *That's "Standard" service . . .* backed by the facilities and experience of four modern, convenient plants, a capable technical staff, and a national hook-up of warehouse distributors.

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Summer is Just Around the Corner

There's nothing unusual about another summer coming. Probably it will be the same as the last one—hot, humid and a swell time to take a long vacation—and that's right where the trouble begins.

During all those days when you'll play golf and swim, we'll be working like all get-out in our plant. We'll be filling standing orders placed some time ago and rushing shipments on last-minute ones.

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CHEMICAL INDUSTRIES

VOLUME XXXVIII NUMBER 6

A Prelude to Crisis

MANY signs portent an enormous expansion of our chemical activities. But the development of the forthcoming chemical era is predicated upon a natural system of economics in which normal supply and demand are not abrogated by governmental control of production and prices. No other industry has so great a stake in the future of America and no other has more to lose under any system of planned economy be it either reactionary or socialistic. The progress in greater output and lower prices, in the highest wages and satisfactory net earnings on investment, has been won by individual initiative spurred on by real competition in the chemical field; and the impact of political domination is the only possible obstruction that can stop this forward march.

We cannot be blind therefore to the many indications of political tendencies here and abroad that threaten to check chemical development, and we must needs be concerned with the presidential campaign upon which we are about to enter. More than this we must look ahead towards 1940 when (so astute political students tell us) the successful political party of 1936 cannot hope to re-elect its candidate.

One of the most disturbing political portents is the grave probability of inflation—a currency inflation if the Democrats stay in power and an inflation of credit if the Republicans are in control. The financial stage is set for either party to give us a dollar whose purchasing power is five cents in gold; and a nickel-dollar is material for a first-class political revolution.

The gravity of this coming election strikes deeper than the candidates and their issues. It is quite comparable to that critical election of 1860, in that it will determine the whole trend of our government for another half century, for upon it will depend whether in 1940 we have a more-radical-than-Roosevelt opposed to a hard boiled reactionary or whether within the framework of the Constitution and upon the old American plan of government by the people and for the people, a liberal and a conservative candidate shall be presented to the electorate. Every person in American chemical industry should ponder this serious question and expound its real meaning to their friends and neighbors.

A Chemical Hall of Fame

Presentation to the Chemists' Club of the portrait of the late David Wesson by a group of his friends is an appropriate tribute that might very well set a pleasant precedent. He was a man of marked professional attainments whose good chemical work in vegetable oils resulted directly in benefits to mankind. The painting by Wolff not only records his likeness, but reveals tellingly the witty, kindly gentleman he was. Similar fine portraits of men who have played significant rôles upon our chemical stage should from time to time be added to the already notable collection on the walls of this Club. Surely there is no more fitting memorial to a great chemist or an important chemical industrialist, and if the Club continues to exercise the proper restraint in accepting only worthy paintings of truly distinguished men, that collection will in time represent a veritable Chemical Hall of Fame.

Prices and Prospects of American Tung Oil

The situation in tung oil, long a thorn in the side of the paint manufacturer, promises to become much worse rather than better. From Shanghai recent cables report the formation of a Chinese Government marketing monopoly. While details are lacking, the history of every attempt of this sort in the past clearly indicates that tung oil consumers may expect an era of arbitrarilly controlled selling policies and higher prices. To add further confusion, the Senate Committee is reported to have voted on May 25th to include the Bailey Amendment to the revenue bill providing for a tax of four and one-half cents per pound on several vegetable oils including tung.

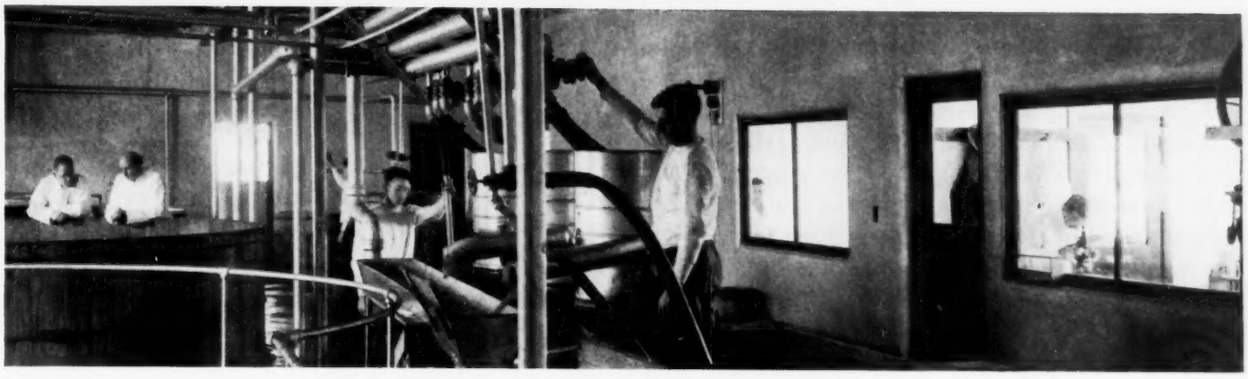
At the moment a price of 18 cents for tung oil spot New York is nominally quoted. In 1933 the price was below five cents. In 1935 on a wave of speculation it went well above 35 cents. Manifestly it is impossible to control at this end the actions of the Chinese Government, although Secretary of State Hull might be persuaded to turn some of his pact makers to an effort to obtain some sort of a protective agreement. It should be possible, however, to set our legislators straight on the economics involved. Certainly no legitimate excuse exists now for an import tax in protection of our infant domestic tung oil industry.

Highly significant is the fact that although the use of tung oil in this country increased 70 per cent. in four years the consumption in the manufacture of paints during the first quarter of this year has dropped below the amount used during the same period of last year. The combined efforts of the Chinese Government and our misguided legislators will inevitably promote the development of substitutes, and we will perhaps awake to find that an oil crop already proved to be well suited for production in certain of our southern states has had its natural growth stunted and its markets restricted. For both American producer and consumer a price of about 12 cents is pretty generally recognized as making the crop profitable and the use of the oil as widespread as possible.

Handmaiden to the Industry

Medals, honorary degrees, royalties reward the technician who contributes the discovery of a new product or a new process to our chemical advancement. The industrialist who brings the new product to market or produces a better or a cheaper product by means of the improved process, profits more tangibly if less directly. But there is a third partner in almost every industrial chemical development whose contribution is vital to success, but whose rewards are extremely indirect. Neither honors nor profits accrue directly to the manufacturer of the plant equipment which makes the operation commercially possible.

As chemical technique becomes more complex, as we employ higher temperatures and greater pressures, as control becomes increasingly exact and operations approach closer and closer to the twin ideals of wholly automatic and continuous production, the contribution made by makers of apparatus becomes progressively valuable and more important. While we all recognize that much of our industrial progress of the years before us will depend basically upon better plant equipment, nevertheless we are too prone to overlook our mounting debt to the designers and fabricators of these indispensable tools of chemical manufacture. It is in recognition of their great services that we have just published a companion volume to our historical review of American chemical industry issued a year ago as a part of the Tercentenary Celebration. The record of "Equipment's Contribution to Chemical Progress" is full of fascinating interest and facts of practical value. It is a well deserved tribute to the third — and too-often silent — partner in our industrial chemical progress.



Yeast from Wood

By E. W. Eweson

ABOUT six months ago, operations began in a new chemical operation linking together two so fundamentally different industries as sulfite pulp and yeast manufacture. Close to 20,000 pounds of baker's yeast per week is produced at the Liverpool, Nova Scotia plant of Best Yeast, Limited, and additional equipment to double this production capacity is now being installed. It would appear that a new solution of the pulp industry's waste problem is thus presented.

In the manufacture of baker's yeast, a pure cultivated yeast is used as starting material, and for bread-making the race employed consists solely of *Saccharomyces cerevisiae*. This yeast, the so-called seed-yeast, is supplied with the nutrition which consists chiefly of carbohydrates in the form of sugar. Formerly, malted cereals were used for this purpose. This was a complicated, tedious process which frequently resulted in anything but a pure yeast. Subsequently, came the use of molasses which also is not of a pure nature. Recently, utilization of the sugar of sulfite liquor in the manufacture of yeast has been successful.

The waste liquor in the sulfite mills from cooking wood, mostly spruce and hemlock, under pressure in digestors with calcium bisulfite and water, contains all the lignin in the wood and also about 2 to 3 per cent. of sugar, in all, about 10 to 12 per cent. solid matters. The sugar goes into solution in the liquor during the cooking process and reaches a maximum concentration in the latter part of the cooking of about 3 to 3.5 per cent. when the liquor has a temperature of 130° to 140° C. If the temperature is raised to 145° or more, part of the sugar is destroyed. One sulfite mill, Fors, in Sweden, making easy bleaching pulp, found the best quality of pulp when the sugar concentration was maximum. Accordingly, they based the cooking upon the sugar content, although they had no interest in utilizing the sugar.

The amount of liquor from sulfite pulp cooking is about 8 or 10 to one by weight of the pulp produced. Klason reports that when cooking Swedish spruce, *Picea abies* or *excelsa* with a yield of about 45 per cent. sulfite pulp, the waste liquor contains per each metric ton (1000 kilo) of cellulose:

Lignin	644	kilo
Carbohydrates	311	"
Proteins	15	"
Resin and fats	73	"
SO_2 combined with lignin	235	"
CaO combined with lignosulfonic acid	102	"

The specific weight of the liquor is 1.045 to 1.060.

The carbohydrates are mostly sugar, and Klason reports this waste liquor sugar to consist of:

Pentosen (arabinos)	26.9%	(non-fermentable)
Mannos	15.6%	
Galaktos	8.1%	
Glucos	49.4%	

Other authors give slightly different figures but it seems possible to figure that about 65 per cent. of the total reducing sugars are fermentable.

Chemists have long made zealous endeavors to find some profitable use for the enormous quantities of waste liquor now dumped from the sulfite mills in nearby rivers. The most serious earlier attempt to utilize the sugars in this liquor was made by O. W. Wilcox (1912). The Germans, hard pressed during the World War, also tried to solve the problem. Their researchers made important technical contributions, but without achieving commercial success.

Through the invention of the Swedish engineer, G. Heijkenskjold, it is now not only possible, but highly economical, to utilize this sugar for large-scale manufacture of baker's yeast. Perfected in Europe, where a plant has been in operation since 1929, the process was brought to this side of the Atlantic a little more than a year ago. Liverpool, Nova Scotia, was

chosen for the first plant on the American continent and waste liquor from the Mersey Paper Company's newsprint mill is the raw material.

Molasses, being the main raw material for the manufacture of yeast, according to present methods, is in this new process almost entirely substituted by the sugar in waste liquor. Depending on the sugar content, from 40 to 55 pounds of yeast are manufactured from each ton of waste liquor. Therefore, yield is from 350 to 450 pounds of yeast on the liquor from one ton of sulfite pulp.

According to the Heijkenskjold method, the hot sulfite waste liquor is brought into large neutralizing tanks and there under aeration treated with powdered limestone and lime and soda to bring acidity down to a pH 6 to 6.5. At the same time the amounts of free and combined SO_2 in the liquor are reduced. Neutralization is effected to avoid any precipitation from the liquor during the yeast cultivation in the fermentation tank. After this treatment, which requires about 24 hours, the liquor is settled in the neutralizing tanks and is then decanted, pumped through a cooler down to suitable fermentation temperature, about 28° to 30° C. or lower, and separated to be freed from any solid matters so that it becomes perfectly clear.

The liquor thus treated for yeast propagation contains most of its original content; *i.e.*, per cubic meter, or 1000 kilo, about 75 kilo lignin and calcium and sulfur in various combinations, as well as free SO_2, besides about 25 kilo sugar, of which latter about 16 kilo are fermentable. The minor part of the solid matters going into the fermentation tank is the fermentable sugar. The sugar concentration in the liquor is very low.

The propagation of yeast is started in the fermentation tank by adding the seed yeast to a solution of about 3 to 5 per cent. sugar, prepared by mixing molasses and sulfite liquor. Organic nitrogen in small amounts may be added in form of malt sprouts, a by-product from the breweries, if the price is favorable. As soon as the yeast cells have started to develop new cells, the liquor is added as it comes from the separator. The propagation goes on similar to molasses yeast cultivation, but only acid ammonium sulfate and ammonium phosphate, or other sources of nitrogen and phosphates, have to be added to supply the nutrients required and to maintain the reaction desired during the propagation. At the plant at Liverpool, only superphosphate and ammonium sulfate are used. It is interesting to see that Wilcox (1912) in his patents understood to use said salts as nourishment for the yeast.

Large amounts of air are supplied to the yeast, in order to protect them against the poisonous effects of the sulfite liquor and to free the liquor from the carbonic acid and other gases developed in the fermentation tank. Before taken into the compressor the air is filtered so that it is practically sterile. In the Finnish plant, situated close to a sulfite pulp mill and a saw mill with many bacteria in the air, oil filter and soda washing of the air sometimes is used. The air used for each fermentation tank in the production of 2000 to 4000 pounds of yeast is 2000 cu. ft. per minute. All the water used is filtered and sterilized. The average yield is about 160 per cent. baker's yeast, figured on the available fermentable sugar with 28 to 30 per cent. dry content of yeast. Experiments show it is possible to obtain a much higher yield figured on the available sugar, but as the sugar in the liquor has practically no value, it is better to be liberal with the sugar and thus produce a higher quality of yeast.

The yeast is separated and washed several times, and the product is of unexcelled purity with good light color and neutral taste. The separated and washed yeast is pressed in a filter press to about normal dry content. After cooling the yeast, it is formed into packages as used and distributed by other yeast plants.

From the beginning of the process until the finished product leaves the factory, the manufacture of the yeast is subject to painstaking care and a constant control in the factory as well as in the laboratory.

The same yeast races used in manufacturing molasses yeast can be used for the yeast out of waste sulfite liquor. In Finland and at the Best Yeast, Ltd., the so-called "Raase 12," *Saccharomyces cerevisiae*, from Gaerungsinstitut in Berlin is used.

American consumption of yeast being somewhat less than 300 million pounds per year, many times as much waste liquor is now dumped in our rivers as is required to manufacture every pound of yeast consumed in this country. Besides being an extremely "cheap" raw material—so cheap that many paper mills are willing to pay to get rid of it—waste sulfite liquor has other advantages when used for the manufacture of yeast. It is absolutely pure in the sense that it contains no bacteria or other undesirable infections, which may adversely affect the growth of the yeast. Waste liquor is also a singularly uniform material. Both characteristics are of importance as they vastly simplify the process of producing a pure and uniform yeast. Furthermore, this new process offers an economical and practical solution to the serious river pollution, now caused by paper mills having to dump their waste sulfite liquor. During the yeast manufacturing process, all fermentable sugar, is, of course, used up as nourishment by the yeast cells; thus, there remains no more sugar to cause any pollution through fermentation in the streams. The waste liquor is furthermore considerably diluted and otherwise processed during its treatment in the yeast plant, and it is as a very harmless waste that it is disposed of from the yeast plant.

As only the sugar is utilized in the Heijkenskjold process, it will still be possible—and more economical—to extract lignin and rosin from waste sulfite liquor, as already practiced at some American mills. With artificial silk, Cellophane and now yeast as milestones on the road of progress, the wood utilizing industries will parallel the dazzling development of coal and tar industries.

Materials for Chemical Pumps

By C. H. S. Tupholme

PUMPS concerned with ordinary duties and less difficult fluids may be considered as based, for constructional purposes, on the cast iron-steel-gunmetal-bronze range of materials. But departtures through policy, specification, and necessity are numerous.

The cast iron applies generally for the casings, although it may become the metal for all parts in handling alkaline liquids. Gunmetal may displace cast iron for casings in salt water uses, though monel metal is used because of its resistance to sea water and to brines encountered in industrial processes. The gunmetals and bronzes apply, with Admiralty gunmetal and phosphor bronze predominating, for such parts as liners, rotors and valves. Steel and bronze are used for pump rods and spindles.

Variations of grade and combination within these classes of materials are extreme, but departures from the general groups are of most significance. These departures have, in most cases, a tendency towards the nickel-alloy steels and the copper-nickel alloy groups.

Various Metals Employed

Salt water and sanitary pump rods and the impellers of corresponding centrifugal types are frequently made of monel metal, while this or one of the other copper-nickel alloys may be used for casing rings and other smaller parts. Both monel metal and nickel alloy steels are used for spindles and such elements as the sliding vanes of rotaries. With certain acids, particularly fruit juices, nickel may be employed, either for parts in contact with the product or for the entire pump. For pump parts, particularly impellers called upon to operate in sea water, the fact that corrosion resistant cast iron has been developed by alloying monel metal with ordinary grey iron is of special interest. Such an iron alloy, which contains virtually nickel 14 per cent., copper 6 per cent., chromium 2 to 4 per cent., was adopted for the impellers of the large pump installed for emptying the world's largest graving dock at Southampton.

A different procedure is shown, for example, by the case of low carbon steel spindles in some centrifugal pumps handling impure river water. The serious pitting trouble experienced here was eliminated by the adoption of case-hardened mild steel.

Great gains have been made in packing, maintenance and pump rod life, under a wide variety of troublesome conditions, by the substitution of monel metal for steel or bronze. Sometimes there may be unexpected contrasts, as with monel metal, giving complete satisfaction in one acid mine water and trouble in another, owing to the presence of ferric sulfate. Again, the steel spindle of a small salt water rotary pump was seriously affected by pitting. The trial of various grades of austenitic corrosion-resisting steel gave little improvement, but monel metal provided a final cure.

Materials of special use in the ordinary range of duties become those of ordinary use in the special range. This range covers conditions and fluids of increased difficulty. The high pressures of many feed pumps and of power pumps for oil pipe lines, the highly viscous nature of many oils and process stocks, the highly volatile or inflammable properties of various liquids, the absence of any inherent lubricating qualities in certain fluids, the effects of weak acids and syrups in the food industry, with the strict conditions against contamination and the varied corrosive influences in all cases create many difficulties that are generally met by the use of pure nickel, copper-nickel alloys and austenitic corrosion-resisting steels as constructional or lining materials.

Prescribing for Special Cases

Demarcation between ranges as classified by materials is not, of course, clearly defined. Many applications of ordinary steels and bronzes are preeminently successful, while other materials such as copper, aluminum and rubber may display merits in specific cases. In the handling of naphtha, for instance, ordinary steel may be preferred simply because other materials are liable to score, while food processing presents several peculiar examples of the necessity for exceptional steps.

The conditions considered so far exclude gritty and solid contents. This class of duty introduces the wear factor as the predominant influence in materials selection. The solid matter carried by the liquid may vary almost between the limits of slime and boulder. It may be the softer sands and clay, or the sharp sands and highly abrasive flints found in suction dredging. It may be fine quartz particles in a mine water or the miscellaneous content of unscreened sewage. There is, in fact, no limit to the variety of clays, mashes, refuse, sands, ashes, ores, gravels, etc., that are deliberately pumped, nor to the odd solids that are unexpectedly recovered—as in the case of the thousands of bullocks' horns lifted by a pump from the bed of a river! Most types of pumps can, if necessary, deal with the softer and smaller contents. The reciprocating type handles gritty fluids but must be safeguarded by suction screens against the larger solids, although a form has recently been developed to pump concrete. The direct handling of solids without screens can only be carried out by employing certain types of centrifugal.

The influence of such conditions on constructional details is easy to appreciate. Provision must be made

for heavy wear of parts and for renewals, and this reduces the scope of the non-ferrous alloys. They can be used for parts in the earlier cases but in general the duty falls upon irons and steels of proved hardness and toughness. Impeller material might be selected from cast steel, manganese steel, or chrome steel. Selection depends upon the conditions. Casing and volute liners might be of such materials as chilled cast iron, ferrosilicon alloy, or manganese steel; shafts of hard steel with austenitic corrosion-resisting steel sleeves are often employed. The newer nitralloy steels find application here.

In contrast with the use of these staunch metals, rubber is employed in some special designs. High resistance to combined abrasion and shock is demanded in materials for pumps facing the duties considered. Rubber possesses this in marked degree, as is well shown by its performance in tires.

Considering the Corrosion Factor

Highly erosive conditions are naturally followed by the highly corrosive ones. The former is mainly concerned with the consequences of passing objectionably active solids through rather large pumps; the latter has generally to consider the effects of objectionably active liquids in rather small pumps. In the selection of materials for pumps working under the intense corrosive influences of active chemical fluids it is essential to have accurate information regarding the conditions encountered. All metals are acted upon to a greater or lesser extent, and the choice is simply the best possible with economic factors and risk of contamination of the product duly considered. Pump practice and corrosion investigation have, between them, established general guidance.

Ordinary metals can be used with certain fluids within defined concentration and temperature limits, and pumps of various kinds are made accordingly. A few engineering materials have a fairly wide value. These include cast iron, hard lead, monel metal and ferrosilicon iron. Hard rubber pumps and others with rubber linings have a good range of application, particularly in the handling of strong caustic solutions and such destructive acids as hydrochloric. But the stoneware lined pump has probably the widest field of usefulness in ensuring freedom from corrosion and contamination.

The problem is one in chemistry and economics rather than in pumping, and chemistry and economics frequently compel the adoption of technically crude pumping methods. Pumping makes drastic demands on the whole field of materials. The pump maker uses all the engineering materials and a few others. He has to face all questions of strength and toughness, hardness and wear, corrosion, treatment and machinability. He appears, so far, to have escaped the factors of high temperature and creep, but new developments in the handling of hot fluids may introduce these to complicate his problems still further.

German Potash Industry Expands

Operations in Germany's potash industry during 1935, as reported by the German Potash Syndicate, registered a material increase compared with the preceding year, according to information received from Vice Consul W. C. Affeld, Jr., and made public by the Commerce Department's Chemical Division. Production of the Syndicate amounted to 1,381,000 metric tons in 1935 compared with 1,211,000 tons in 1934, an increase of 170,000 tons, or approximately 15 per cent.

According to the Syndicate, sales of potash, both domestic and foreign, totalled 1,330,000 metric tons in the year under review, against 1,220,000 tons in 1934, an increase of 110,000 tons, or approximately 9 per cent. The figures relate to potash content; actually tonnage of marketable salts was several times as great, it was stated.

Shipments of potash from Germany to the United States amounted to 284,000 metric tons (bulk basis) during 1935 compared with 200,000 tons during the preceding year, an increase of 84,000 tons, or 42 per cent. Japan is reported to have imported 92,000 metric tons during 1935, compared with 51,000 tons in 1934, an increase of 41,000 tons, or approximately 80 per cent., the report states. The Syndicate reports that exports of potash during the first three months of the current year were appreciably above the level of the corresponding period of 1935, according to the report.

Zinc Oxide in '35

To supply the mineral industry promptly with data on zinc oxide production and markets during the past year, the following information is furnished by the U. S. Bureau of Mines. Sales of zinc oxide by producers in the U. S. amounted to 99,697 short tons valued at $10,237,953 in 1935 compared with 87,088 tons valued at $9,851,421 in '34, representing increases of 14 per cent. in quantity and 4 per cent. in value. Sales of leaded zinc oxide amounted to 29,976 tons valued at $2,791,808 compared with 20,506 tons valued at $2,018,935 in '34, representing increases of 46 per cent. in quantity and 38 per cent. in value. The volume of sales of zinc oxide was the largest recorded since 1930 and that of leaded zinc oxide was the largest since '25.

Distribution of sales of zinc oxide and leaded zinc oxide by uses in 1934 and 1935 is shown below:

Zinc oxide	1934	1935
Rubber	50,145	57,734
Paints	23,741	25,289
Floor coverings and textiles	4,781	7,179
Ceramics	2,963	4,028
Other	5,458	5,467
	87,088	99,697
Leaded zinc oxide		
Paints	20,376	29,632
Rubber	28	36
Other	102	308
	20,506	29,976

Imports of zinc oxide (dry) for consumption in the United States in 1935 totaled 1,931 short tons and of zinc oxide in oil 59 tons compared with 1,204 and 64 tons, respectively, in '34. Exports of zinc oxide were 1,140 short tons in 1935 compared with 1,155 tons in '34.

The Natural Gums and Resins As Chemical Raw Materials

By C. L. Mantell, Ph.D.

Director of Research, American Gum Importers Association

THE term "gum" in strict parlance refers to materials chemically related to sugars and carbohydrates. They form viscous solutions with water in which they are soluble; do not dissolve in drying oils and organic solvents; and when an attempt is made to melt them, they decompose completely on heating, leaving a carbonaceous residue.

The varnish trade, however, usually refers to the natural resins as gums. These resins are insoluble in water. They show more or less complete miscibility or solubility in organic substances and vegetable oils. They are chemically related to the essential oils, being terpenic in nature. In many cases they consist largely of complex organic acids and their esters and inert, large-formula materials called resenes. When the varnish resins are heated they melt, after passing through a softening stage, with the distillation of volatile oils. The melted or "run" gum or resin of the varnish maker generally shows solubility in a large number of organic solvents as well as in hot vegetable oils. Some of the softer resins are directly soluble in solvents or oils without heating or decomposition during running. In all cases, however, in their original condition they are totally insoluble in water, a distinct contrast to the material usually designated by the chemist as a gum.

In its original usage, the term "varnish" meant the resin. After the 16th century the word was used to denote a fluid compound, and from then on came to acquire its present meaning. The early Egyptians used natural resins in oils of the linseed type without thinners for decorative purposes, mummy cases, and embalming. The Incas of South America employed natural resins. The properties of these materials were known to the Carthaginians, the Phoenicians, and the earliest Greeks. Evidence exists in the form of varnished objects several thousands of years old and in excellent condition, that natural resins skillfully applied can yield finishes of outstanding durability. The natural lacquers, which are tree exudations, on Chinese and Japanese carriages, armor, bridges, and temples, have withstood long periods of weathering in severe climates. Lacquered tableware, because of its satisfactory performance, is said to have delayed the development of porcelain.

The natural resin business, world-wide in its organization, is conducted in a systematic and organized manner as far as the collection, grading, sorting, preparation for market, and distribution of the product are concerned. It is fully as well set up as a going business as is collection of rubber, the development of naval stores, the production of coconut and palm oil or the preparation of sugar. The natural resin business is a stable one, ready to meet any demands made on it. It is not subject to decreasing supplies or vanishing sources of material. Its art in varnish making is old, well established, and free from patent restrictions and the attendant difficulties of such influences. The natural resins are forest products rather than synthetic materials prepared from mineral resources. As forest products they are capable of indefinite renewal.

The natural resins are divided according to their use into those which are spirit soluble and those which are oil soluble. The word "spirit" originally meant alcohol, but now embraces a large variety of organic solvents. The spirit soluble resins are generally directly soluble either cold or with the aid of mild heating. They are generally soft. The oil soluble resins are usually hard and are not directly soluble in vegetable oils, but are converted into this form through processing by thermal methods.

Designations of the resins indicate either their country of origin or some distinguishing characteristic, particularly color, or the locality at which they enter commerce, or at which they are collected. They are further classified into three major types: the damars, generally spirit soluble; the kauris, often oil soluble without intense thermal processing; and the copals which are almost insoluble in solvents and oils unless thermally broken down. Over the whole range of the natural resins there is a practically continuous series of solubility and hardness, from the softest damars obtained from fresh tappings of living trees, through the harder damars, the semi-fossilized copals, the kauris, to the hardest copals of the fossil type. As a general rule, solubility decreases with increase in hardness.

For the purposes of this paper, the natural resins will be understood to include those employed primarily in varnishes and finishing materials, but to exclude shellac, rosin and its derivatives. The natural resins originate outside of the United States and are therefore

all imported. The United States produces no natural resins and therefore exports none. Over the period of 1926 to 1934 the natural resin imports have been about 38,000,000 pounds annually. For the last six years the average price has been about 7½ cents a pound. For the nine-year period the average annual import of copal has been some 23,000,000 pounds, of kauri 3,000,000, and of damar about 12,000,000. A table of imports is given below. Importations into the United States are made through American representatives of foreign collecting, grading, and distributing agencies who in turn arrange for sale of the materials to American importers who supply their customers. Stocks are usually not large, so that it is fair to infer that annual imports represent annual consumption.

Table 1. Resins Imported Into the United States (pounds)

Year	Damar	Kauri	Copals	Total
1926	13,532,100	4,871,400	33,345,900	51,749,400
1927	13,832,100	3,653,200	33,205,400	50,690,700
1928	14,152,900	4,570,600	30,221,600	48,945,100
1929	19,130,914	4,870,084	37,976,150	61,977,148
1930	11,217,100	2,889,569	20,773,011	34,879,680
1931	11,733,593	1,571,221	15,303,085	28,607,899
1932	8,552,535	769,511	10,236,984	19,559,030
1933	12,959,928	1,903,103	15,312,303	30,175,334
1934	12,329,000	741,000	12,689,000	25,759,000
*1935	13,500,000	1,400,000	19,500,000	34,400,000

* Based on statistical figures for the first ten months of 1935.

In preparation for the market, the natural resins pass through a number of grading and cleaning operations, some of which are done by machine but others by hand. These may involve water washing, screening, floating, winnowing, sandblasting, hand picking and sorting, and hand scraping to remove surface coatings. The different materials, depending upon their origin, are received in American ports in bags, boxes, baskets, or cases. They are on the free list of the Tariff Act and therefore pay no import duty. The origins of the natural resins under their commercial designations are shown in Table 2, and their packages and containers in Table 3.

Table 2. Origin of Natural Resins

Resin	Class	Tree	Major use	Country of origin
Boea	Copal-Fossil	Agathis Alba	Oil varnishes	Netherlands, East Indies
Congo	Copal-Fossil	Copaifera	Oil varnishes	Belgian Congo
Kauri	Copal-Fossil	Agathis Australis	Oil varnishes	New Zealand
Manila	Copal	Agathis Alba	Oil and spirit varnishes	Netherlands, East Indies, Philippine Islands
Pontianak	Copal	Agathis Alba	Oil and spirit varnishes	Borneo, East Indies
Batavia	Damar	Hopea, Shorea	Oil and spirit varnishes	Sumatra, Borneo, Java
Batu	Damar	Shorea	Oil varnishes	Malaya, East Indies
Black	Damar	Burseraceae	Oil varnishes	Malaya, East Indies
E. I. Macassar	Damar	Dipterocarpacae	Spirit varnishes	Celebes, East Indies
E. I. Singapore	Damar	Balanocarpus	Oil and spirit varnishes	Sumatra, Borneo, Malaya, East Indies

Table 3. Packages and Containers

Resin	Imported from	Package	Net weight of package (pounds)
Boea	Macassar, Netherlands, East Indies	Basket bags	About 160
Congo	Antwerp	Bags	112 and 120
Kauri	New Zealand	Cases, large	224-252
Manila	East Indian ports, Manila, P. I.	Basket bags and bags	160
Pontianak	Pontianak, Borneo, Singapore	Cases (Bold) and bags	Cases 224 Bags 160
Batavia	Batavia	Cases	136
Batu	Singapore and East Indian ports	Bags	160
Black	East Indian ports (Singapore)	Bags	160
E. I. Macassar	Macassar, Netherlands, East Indies	Basket bags	175 to 200
E. I. Singapore	Singapore, Malaya	Cases	224

A classification of these according to their properties is given in Table 4.

Table 4. Classification of Natural Resins

I. Low acid number resins, including Damar and East India type
   - A. Damar resins—spirit and oil soluble—direct acid number 25-45, M. P. 90-110° C.
     1. Batavia
     2. Singapore
   - B. East India fossil or semi-fossil resins—oil soluble—indirect acid number 25-40, M. P. 125-180° C.
     1. Batu
     2. Black (Damar Hitam)
     3. East India Singapore (Rasak)
     4. East India Macassar (Hiroe)

II. Resins of high acid number originating in the East Indies, Copal type
   - A. Manila resins
     1. Melengket or soft resins—spirit soluble—indirect acid number 135-160, M. P. 110-135° C. Macassar
     2. Loba or half hard resins—spirit soluble—indirect acid number 140-150, M. P. 110-120° C. Loba
     3. Fossil or hard resins—spirit and oil soluble—indirect acid number 110-150, M. P. 140-165° C. Boea, Pontianak.

III. African fossil or semi-fossil oil soluble—indirect acid number 110-135, M. P. 140-220° C.
   - A. Congo

IV. New Zealand fossil or semi-fossil resins—spirit and oil soluble—indirect acid number 55-70, M. P. 120-160° C.
   - A. Kauri
   - B. Bush Kauri

Descriptions of the commercial grades are given on the following pages.

Commercial Grades of Natural Resins

Singapore Damar Gums

Singapore Damar No. 1, Singapore Damar No. 2, Singapore Damar No. 3, Singapore Damar Chips, Singapore Damar Seeds, Singapore Damar Dust.

Pale East India Gums (Singapore Packing)

Pale East India Bold, Pale East India Nubs, Pale East India Chips, Pale East India Dust.

Pale East India Gums (Macassar Packing)

Pale East India Bold—Hiroe, Pale East India Nubs—Hiroe, Pale East India Chips—Hiroe, Pale East India Dust—Hiroe.

The gradings of Singapore Damar are on the basis of color and freedom from impurities, the number 1 being the lightest or most nearly white. This grade is translucent but almost transparent. Numbers 2 and 3 are less transparent and have some color. The designations Chips, Seeds, and Dust are primarily size classifications, but decreasing size usually carries with it increasing amounts of impurities.

The Pale East India gums of Singapore packing are redder than those known as Singapore Damar. The Pale East India gums of Macassar packing, often called Hiroe, contain more wax than the Singapore Damar. The name Rasak is often applied to Pale East India gums from Dutch Borneo. The Bold designation refers to size of pieces, that is, large and clean. The Nubs are smaller, of the order of 2 to 4 in. in largest dimension. Chips, Seeds, and Dust are size and quality gradings analogous to those of Singapore Damar.

Batavia Damar Gums

Batavia Damar A/E Standard, Batavia Damar A/D Mixed, Batavia Damar "A", Batavia Damar "B", Batavia Damar "C", Batavia Damar "D", Batavia Damar "E", Batavia Damar "F", Batavia Damar Dust.

The letter designations of Batavia Damar are primarily size classifications and secondarily those of color and impurities, the amount of which usually increase with decreasing size. The grades refer to the material retained on the specific screens as given below. The A material is that retained on an A screen; B material, that which is through the A screen and retained on the B; C material is that which passes through the B screen and is held back by the C screen; D material, in a similar manner, that which passes through the C screen and is retained on the D; an E material, often known as Seeds, that which passes through the D screen and is retained on the E sieve, while an F material and Dust are products passing through the E screen. The F grade is dirtier than E and is composed of splinters rather than seeds.

Sieves Used in Preparing Standard Qualities of Batavia Gum Damar

A—Sieve of gauze with six-cornered holes about 15 mm. (38/64 in. or .59 in.) long and broad, made of wire Birmingham Wire Gauge size 21, or .032 in. diameter.

B—Sieve of iron gauze, 3 square holes per inch, made of wire Birmingham Wire Gauge size 17, or .058 in. diameter.

C—Sieve of iron gauze, 6 square holes per inch, made of wire Birmingham Wire Gauge size 19, or .042 in. diameter.

D—Sieve of iron gauze, 11 square holes per inch, made of wire Birmingham Wire Gauge size 23, or .025 in. diameter.

E—Sieve of yellow copper gauze, 40 square holes per inch, made of wire Birmingham Wire Gauge size 30, or .012 in. diameter.

Batu East India Gums

Batu Scraped, Batu Unscraped, Batu Nubs and Chips, Batu Chips, Batu Dust.

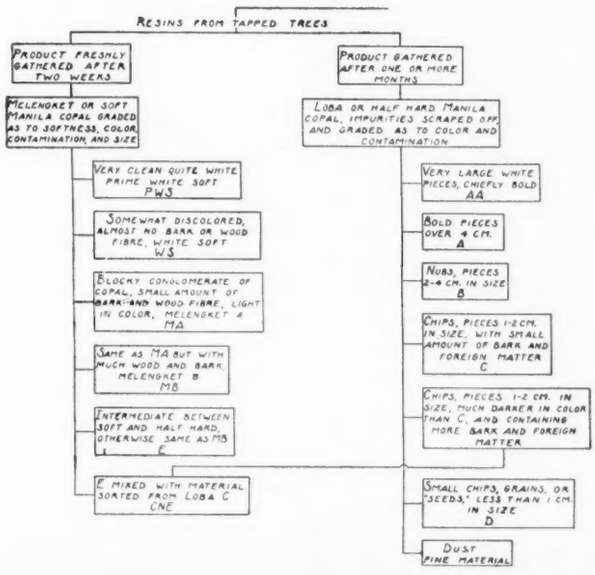
Black East India Gums

Black Bold Scraped, Black Bold Unscraped, Black Nubs and Chips.

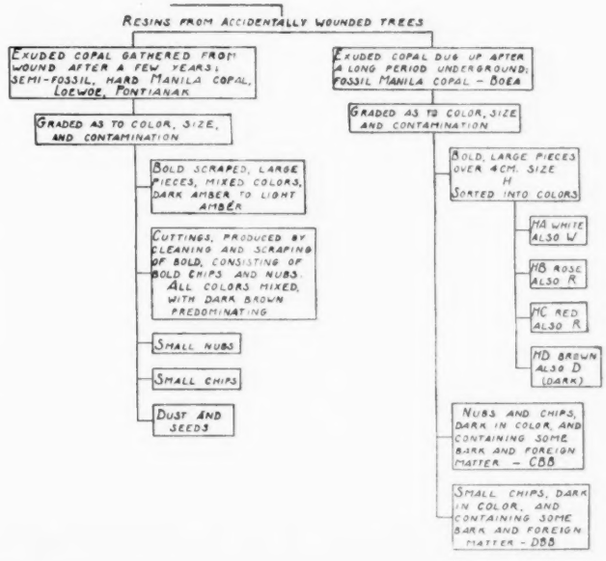
The Batus and Black East India gums are both Damars. The Batu is opaque and usually quite light in color, being predominantly yellow, while the Black is very dark, almost black. This material is known among the natives as Damar Hitam or Black Damar.

The term Bold is a size classification, referring to large pieces which are either scraped by hand with a knife to remove surface coatings, crusty material, or oxidized resin, or unscraped, a designation which refers to original pieces after sorting and preliminary cleaning. Nubs and Chips are materials of smaller size, either occurring naturally or as the result of cleaning,

Manila Resins from *Agathis Alba* Spirit Soluble


RESINS FROM TAPPED TREES
PRODUCT FRESHLY GATHERED AFTER TWO WEEKS
PRODUCT GATHERED AFTER ONE OR MORE MONTHS
MELENGKET OR SOFT MANILA COPAL GRADED AS TO SOFTNESS, COLOR, CONTAMINATION, AND SIZE
LOBA OR HALF HARD MANILA COPAL, IMPURITIES SCRAPED OFF AND GRADED AS TO COLOR AND CONTAMINATION
VERY CLEAN QUITE WHITE PRIME WHITE SOFT PWS
SOMEWHAT DISCOLORED, ALMOST NO BARK OR WOOD FIBRE, WHITE SOFT WS
BLOCKY CONGLOMERATE OF COPAL, SMALL AMOUNT OF BARK AND WOOD FIBRE, LIGHT IN COLOR, MELENGKET A MA
SAME AS MA BUT WITH MUCH WOOD AND BARK MELENGKET B MB
INTERMEDIATE BETWEEN SOFT AND HALF HARD, OTHERWISE SAME AS MB E
E MIXED WITH MATERIAL SORTED FROM LOBA C CNE
VERY LARGE WHITE PIECES, CHIEFLY BOLD AA
BOLD PIECES OVER 4 CM. A
NUBS, PIECES 2-4 CM. IN SIZE B
CHIPS, PIECES 1-2 CM. IN SIZE, WITH SMALL AMOUNT OF BARK AND FOREIGN MATTER C
CHIPS, PIECES 1-2 CM. IN SIZE, MUCH DARKER IN COLOR THAN C, AND CONTAINING MORE BARK AND FOREIGN MATTER
SMALL CHIPS, GRAINS, OR "SEEDS," LESS THAN 1 CM. IN SIZE D
DUST FINE MATERIAL

Manila Resins from *Agathis Alba* Oil and Spirit Soluble


RESINS FROM ACCIDENTALLY WOUNDED TREES
EXUDED COPAL GATHERED FROM WOUND AFTER A FEW YEARS; SEMI-FOSSIL, HARD MANILA COPAL, LOEWOE, PONTIANAK
EXUDED COPAL DUG UP AFTER A LONG PERIOD UNDERGROUND; FOSSIL MANILA COPAL - BOEA
GRADED AS TO COLOR, SIZE, AND CONTAMINATION
GRADED AS TO COLOR, SIZE AND CONTAMINATION
BOLD SCRAPED, LARGE PIECES, MIXED COLORS, DARK AMBER TO LIGHT AMBER
CUTTINGS, PRODUCED BY CLEANING AND SCRAPING OF BOLD, CONSISTING OF BOLD CHIPS AND NUBS. ALL COLORS MIXED, WITH DARK BROWN PREDOMINATING
SMALL NUBS
SMALL CHIPS
DUST AND SEEDS
BOLD, LARGE PIECES OVER 4CM. SIZE H
SORTED INTO COLORS
MA WHITE ALSO W
MB ROSE ALSO R
MC RED ALSO R
MD BROWN ALSO D (DARK)
NUBS AND CHIPS, DARK IN COLOR, AND CONTAINING SOME BARK AND FOREIGN MATTER - CBB
SMALL CHIPS, DARK IN COLOR, AND CONTAINING SOME BARK AND FOREIGN MATTER - DBB

while the terms Chips and Dust mean the same thing as heretofore stated.

Pontianak Gums

Pontianak Bold Scraped, Pontianak Mixed Bold, Pontianak Cuttings, Pontianak Nubs, Pontianak Chips.

Boea (Manila Fossil) Gums

Hard Bold Amber, Hard Bold Dark.

Pontianak is one of the Manila gums from *Agathis Alba*. The Bold scraped is characterized by being harder than the Mixed Bold which is quite hard but of varying colors. The Cuttings are large chips resulting from cleaning or breaking down Bold pieces. Nubs and Chips are size classifications as before. Pontianak is a semi-fossil, hard Manila copal. It is exuded resin which has hardened over a period of several years. Exudations ordinarily result from accidental wounding of the trees.

Boea is a fossil Manila resin. It is exuded copal resin dug up after a long period underground. It is of the same order of hardness as Pontianak.

Kauri Gums

Pale XXXXX, Pale XXXX, Pale XXX, Pale XX, Pale No. 1, Pale No. 2, Pale No. 3, Pale Chips, Pale Dust, Brown XXX, Brown X, Brown No. 1, Brown No. 2, Brown No. 3, Brown Chips, Brown Dust, Bush Bold, Bush Chips.

In the Kauris the Pale designation refers to lack of color. The higher the number of crosses, the closer the approach to white and the greater the freedom from impurities. The cross designation in the Brown is similar: the greater the number of crosses, the closer to complete freedom from impurities. In general, the Kauri gums are transparent in the Pale grades. The number 1, 2, and 3 designations are orders of hardness, number 1 being harder than 2, and number 2 harder than 3. These grades, however, are lower than those designated with the crosses. The Chips and Dust are size classifications, as in the case of the other gums. Bush gum is virgin material which has fossilized in place on branches of trees and has not been found underground.

Manila Gums (Macassar) Spirit Soluble

Manila "WS" Pale Soft, Manila "MA" Soft Blocky, Manila "MB" Soft Blocky, Manila Loba "A" Bold Pale, Manila Loba "B" Bold Pale Nubs, Manila Loba "FAX" Pale Nubs, Manila Loba "C" Bold Pale Chips, Manila Loba "D" Small Pale Chips, Manila Loba "DK" Dark Chips, Manila Loba "CNE" Dark Nubs, Manila Loba Dust, Manila "CBB" Medium Pale Nubs, Manila "DBB" Pale Chips.

The Manila resins from *Agathis Alba*, which include the Melengket or soft resins, the Loba or half-hard, the Pontianak and the Boea, which are the hard materials, are shown in Figure 1. Descriptions of the letter designations, which are primarily size and secondarily amounts of contamination, are shown in the chart. The Melengket and Loba resins are spirit soluble—that is, soluble in alcohol and related solvents. The WS, MA, and MB are soft resins; the Lobas are half-hard. The FAX Pale Nubs are cleaner and lighter than the DK or small Dark Chips which are quite dirty, or the CNE which contains considerable crusty gum.

Manila Gums (Philippine) Spirit Soluble

Manila Bold Pale Scraped, Manila Bold Pale Nubs, Manila Bold Extra Pale Sorts, Manila Bold Pale Chips, Manila Pale Small Chips, Manila Bold Amber Sorts, Manila Seeds and Dust.

Philippine Manila gums are obtained from the Philippine Islands and are spirit soluble. They are similar in character to the Loba gums. The gradings are according to color, cleanliness, and size.

Singapore Manila Gums

White Split Chips, Singapore Manila Dust.

Various Gums

Gum Elemi, Gum Mastic, Red Gum Coarse, Red Gum Powdered, Sandarac Gum.

Gum Elemi is the soft colorless or white resin obtained from the tree *Canarium indicum* in the Philippines. It is soluble in a number of organic solvents such as alcohol, ether, and chloroform. It finds application in the manufacture of paints, varnishes, lacquers, inks, linoleum, and in a number of process industries.

Mastic is produced by the tree *Pistacia lentiscus*. It is mainly collected on the island of Chios, east of the Grecian mainland. It is often employed in the manufacture of high grade varnishes of very pale color for the protection of pictures in oils and water-colors. The common solvents are alcohol or turpentine.

Red gum is also known as gum accroides or grass tree gum. It is derived from various species of *Xanthorrhoea*. Its main use is in the manufacture of spirit varnishes.

Sandarac is obtained from coniferous trees of the species *Tetraclinis*. It is used for the manufacture of white hard spirit varnishes for labels, cardboard, leather, wood, and metals.

Congo Gums

1. Water White Transparent. 2. Cloudy White. 3. Selected Pale Straw Bold. 4. Pale Bold Straw. 5. Pale Bold Straw. 6. Pale Amber Bold. 7. Pale Straw Bold Washed. 8. Light Amber Bold. 9. Medium Light Amber Bold. 10. Rescraped Hard Dark Amber. 11. Hard Dark Amber Bold. 12. Selected Sorts Bold. 13. Dark Sorts Bold. 14. Selected Fully Scraped Ivory. 15. Ordinary Ivory Sorts. 16. Inferior Ivory Sorts. 17. No. 1 Pale Fingers. 18. Pale Straw Nubs. 19. Pale Straw Nubs. 20. Dark Hard Amber Nubs. 21. Selected Nubs Ordinary. 22. Small Mixed Nubs. 23. Dark Mixed Nubs. 24. No. 1 Ivory Nubs. 25. No. 2 Natural Ivory Nubs. 26. Bold Pale Chips. 27. Small Pale Chips. 28. Pale Dust.

The Congos are all designated by numbers which are indicative of transparency, hardness, and freedom from color. The lower the number, the harder the gum and the lighter the color. In the case of two close numbers which have the same designation, the lower number indicates a more severe classification, the gum in this designation being harder; a higher number indi-

cates a weaker material of the same type. As in the case of the other gums the terms Bold, Nubs, Chips, and Dust are size classifications. Sorts are grades of a number of colors, while fingers indicate a shape which is similar to that of the human finger.

Until a few years ago, chemical development of the natural resins was neglected. As a result they lost ground to their aggressive synthetic competitors. Recently, however, due to research and development activity on the part of the natural resin producers and importers, they are recovering lost territory. Their qualities are subject to constant improvement, more careful grading, and standardization through cooperative effort which is world wide in nature.

Their uses are very diversified, ranging from common finishing materials as well known as varnishes, paints, lacquers, and enamels of numerous varieties, paper sizing and finishes, adhesives, plastics, decorative and protective finishes, cements, inks, linoleum and floor coverings, rubber compositions, oil-cloth, chewing gum, incense, and medicine.

Uses of Japan Driers

Japan driers are of long established usage. They consist of compounds of manganese, cobalt, lead, and other metals in the form of linoleates, resinates, or other compounds dissolved in vehicles to which natural resins are added. Various grades of Kauri have long been employed for this purpose. Adhesives of the Cellophane type in a number of instances depend largely upon the qualities of different grades of Manila natural resins for their adhesivesness and ease of working. Innumerable gasketing materials are compounded of natural resins. Traffic marking paints on our modern highways are large consumers of the natural resins which are solvent soluble. Fluids for the preparation of transparencies, the decorative finishing of lampshades, translucent applications for glass, all are fundamentally based on the use of natural resins. Characteristic properties of specialized inks are often imparted through the characteristics of the natural resin constituents.

Some use is made of the salts of the natural resin acids as emulsifiers, wetting agents, dispersion producers, as well as foam stabilizers. Many of the applications are of the art and secret practice type, particular and peculiar to definite lines of manufacturing.

The natural resins are in general cheap, readily and widely available in a large number of grades, susceptible to processing to produce a wide number of materials of required characteristics. They are able to meet any demands made on them, inasmuch as they are forest products capable of infinite renewal. Their present production in various countries of the world is the special concern of individual governments who maintain regulations for the continued output of quality materials.

Scientific Color Determination

In the New Equipment Section several months ago the announcement of a new colorimeter was reported which aroused great interest on the part of CHEMICAL INDUSTRIES' readers. More detailed information is now available on the actual operation of the machine.

A sample 2" in diameter ordinarily is all that is required to make a test. In certain cases where small samples are to be tested, a special plate is put under the machine to care for samples down to 5/8" in diameter.

The reading of the instrument at first is the density reading or the value of all the total reflected wave lengths of light. This reading from each of two samples immediately shows the slightest discrepancy in match and is far more sensitive than the human eye to all colors, including blacks. When such materials as crepes, chiffons, satins, etc., are to be tested, they are placed upon a piece of glass which in turn is supported two inches above any other material so that only the reflected light from the cloth is registered by the electric eye. This will give the exact comparison between two weaves of cloth which are the same.

The total density reading determines the match; then, if further information is wanted to determine what changes are necessary in the dyeing to bring the shades to match, the filters are inserted. First, the red filter is inserted and a reading taken from each sample. These are put down in the column No. 1 for sample No. 1, and in column No. 2 for sample No. 2. Then the green filter is used and a like reading taken on both samples and put in the column under the sample. This is repeated for the blue filter. You then have the primary color value for each sample. At the right, a third column should be set up in which the plus or minus quantity should be marked in comparing the filter color value from each sample. This gives you the discrepancy in color match in the primary colors.

Now if a record of this color is desired, the total readings from the three filters are added together for sample No. 1. The same is done for sample No. 2. Then, by dividing each color reading of one sample by the total of all the color readings, you have the per cent. make-up by primary colors of each sample. This information gives you identification and permanent record of this sample.

Filters by Corning Glass

The filters used for this instrument are special filters furnished by the Corning Glass Works of Corning, N. Y., and will give you the only color identification which is possible to duplicate. These filters are charted with certain characteristics to pass only the rays of colored light for which they are designed, and give complete information heretofore not available to those with color problems.

SAMPLE TEST OF TWO GREEN SHADES

	Sample No. 1	*Sample No. 2*	*Difference*
Density reading	675	700	plus 25 points

FILTER ANALYSIS TO DETERMINE THE DISCREPANCY IN MATCH

	Per cent. of Sample No. 1 content	*Per cent. of Sample No. 2 content*	*Difference*
Red reads ...	115 — 30.7%	125 — 32.9%	plus 10 points
Green reads ..	150 — 40.0%	165 — 43.4%	plus 15 points
Blue reads ...	110 — 29.3%	90 — 23.7%	minus 20 points
Total	375 — 100%	380 — 100%	

This gives a permanent record based upon reflected light with primary filters which is the only color identification we have.

Chemical of the Paper

Part

"Who is it finds the new uses for paper?" asked John Schuber.

A. E. H. Fair, John Schuber, C. C. Heritage, G. K. Spence

CONTINUING the discussion by twelve of the country's greatest paper chemical technologists who gathered around a dinner table at the Chemists' Club as the guests of CHEMICAL INDUSTRIES: having discussed the technical services and the type of salesmanship of chemical suppliers, the group went on to a discussion of some of the problems connected with more specific chemical materials.

Mr. Haynes: Has anyone any suggestions for research on the better use of chemicals in the paper field?

Mr. Sutermeister: I would like to have somebody tell me how to make a starch coating waterproof.

Mr. Traquair: Put on a coat of nitrocellulose lacquer.

Mr. Sutermeister: It is no longer a starch coating then.

Mr. Heritage: Make it two-thirds casein. (Laughter)

Mr. Traquair: There is a point to be observed in many of the new things that are being produced, especially more recently, of the nature of nitrocellulose, emulsions, waxes, synthetic resins, whether in solution or in emulsion. These are being offered to paper companies. They should first take them up with converting companies who want to coat a few reams or treat a few yards of paper for some special purpose, because paper makers generally are making paper by the ton, and the use requirements of some of these special finishes, special characteristics in paper, amount to only fifty or one hundred pounds.

Mr. Maull: You can't escape it then. The converter will turn around and ask you for a special paper in order to use his particular application. (Laughter)

Mr. Heritage: To come back to your question of what chemicals might do for us, all will agree that we want to make brighter papers. We want to make more opaque papers. We want to make stronger papers. We want to make better formed papers.

Mr. Haynes: Just what do you mean by that?

Mr. Heritage: More uniform arrangement of fibres throughout the sheet. It is a matter of uniformity. Without question there must be chemicals which will to a considerable extent control those properties in a sheet. As a matter of fact, we know of several chemicals which greatly improve the formation, stop the fibres from clustering on the wire, keep them apart, until we have the water out of them. A tremendous field there hasn't been touched.

Mr. Spence: Printability, that is one of the most important characteristics.

Mr. Abrams: Then there is the field of pulping. We have relatively few chemical processes for making pulp. It seems to me that if the chemical manufacturers were willing to go into a long-time program, it is conceivable that they might work out better and cheaper methods of pulping.

Mr. Murdock: But you are passing your problems of paper making over to the chemical manufacturer.

Mr. Abrams: He is the one who is going to sell the chemicals.

Mr. Traquair: We all have used, say, caustic soda for cooking wood. It also has occurred to most of us that perhaps ammonia might do. We find it doesn't do at all. It gives quite a different result, but it is quite possible that we may find other chemicals that will cook wood better than anything we use at present.

Whose Problem?

Mr. Murdock: That is the pulp man's problem, and not the chemical manufacturer's problem.

Mr. Schuber: Nevertheless, he can aid in doing that and it would be advantageous for him to do so because then he would sell his particular product.

Mr. Murdock: It would be wonderful if he could, but you ask him to step right out of his own profession.

Mr. Schuber: Doesn't the paper manufacturer try to find new use requirements for his product? In fact, the paper converters are doing that every day now.

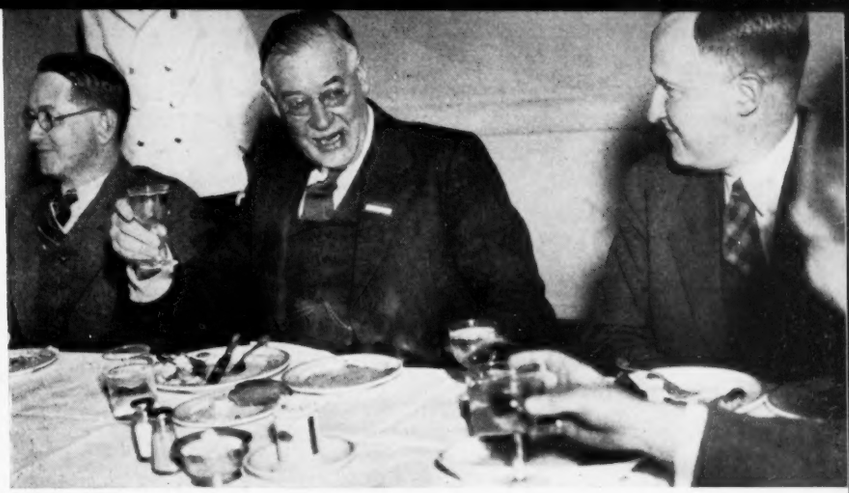
Mr. Maull: You mean new uses for papers?

Mr. Schuber: Yes.

Mr. Abrams: I fear, Mr. Haynes, the conclusion you arrive at is that we think the chemical industry hasn't done a thing for the paper industry, but I don't think that is true at all. Many of them have been very progressive. We have to be forward-looking as well as

Problems Industries

Two



"A toast," proposed Mr. Traquair, "to the chemical salesman who knows his products."
C. E. Curran, John Traquair, R. G. MacDonald, Williams Haynes.

the chemical industry, and there will be meeting points where we will arrive at results jointly. It is not a case of the chemical industry doing all the research, nor of the paper industry doing it all. It is a halfway meeting.

Mr. Murdock: We can take all the salesmen from the different companies selling chemicals to us, and we can very readily classify both men and companies, as to those who are really trying to help us and those that are just trying to work us so that they can make a profit.

Mr. Traquair: As a typical example the chlorine companies have really made an effort to develop methods of using their product. They have devised regulating devices and methods of application. Some of their methods have been adopted. I should say they are better in some cases than the ones devised by the paper industry.

Ballyhoo for Alkalies

Mr. Murdock: That is correct, but how much ballyhoo have they put around that application? In a meeting of my committee the other day, we decided on what we could do.

Mr. Haynes: What committee is that?

Mr. Murdock: That is the Alkaline Pulping Committee of the Technical Association of the Pulp and Paper Industry. The bleach producers seem to be trying to put emphasis on points on which no emphasis is necessary in order to make it look complicated.

Mr. Krimmel: Are you talking about chlorine bleaching?

Mr. Murdock: Chlorine bleaching or lime bleaching.

Mr. Haynes: Is the quality of the standard chemicals you buy uniform?

Mr. Traquair: Yes, very.

Mr. Murdock: It is so uniform that we don't bother much to find out whether it is or not. (Laughter)

Mr. Haynes: Which is a perfect answer. (Laughter)

Mr. Traquair: We analyze once a year, just as a matter of form.

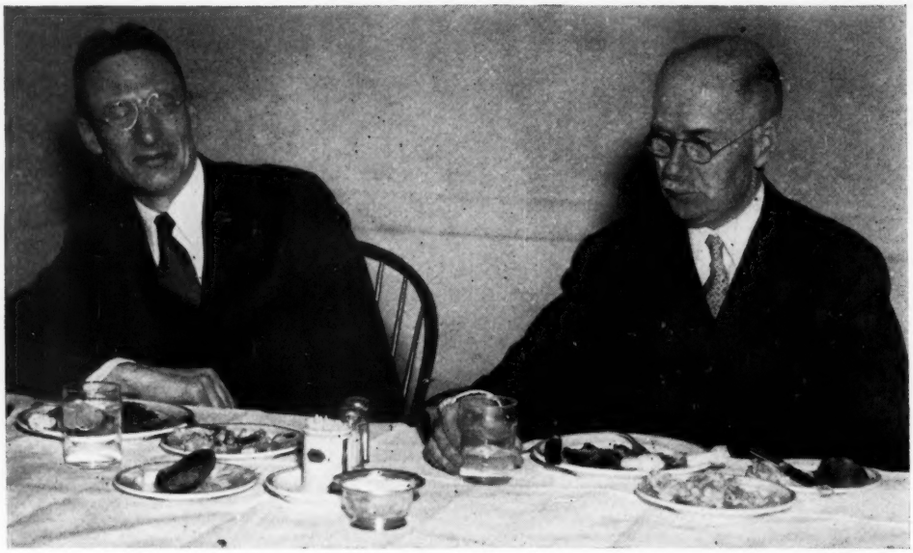
Mr. Murdock: Another question is, are the alum people going to stand by and let the paper people make their own alum? Are they going to try to make an anhydrous alum? The size people have really been trying to make a dry size to save shipment of water, at least an attempt to solve the problem for us is being made. We know they are trying, and when a person tries, that is all you can ask.

Mr. Traquair: Perhaps the chemical industry could produce a white pigment cheaper than titanium oxide which would be equally opaque and have an equally high refractive index.

Clays

Mr. Heritage: Talking about pigments, let's take the simplest one which is clay. The use requirements of clay are well known to all of us. But it wasn't more than six years ago that the general practice was to sell clay on color. If you tried to talk anything else than color, you soon found you were back on color again. However, I do want to put this on the record: that the domestic clay industry is trying hard to bring their clays into line with the use requirements and to tell the consumer — the paper industry in this case — what each clay is good for, what it will do, and they are succeeding.

Mr. Clark: Several years ago we did some work on English clays, more particularly for loading, not for coating papers. We had occasion to contact the four largest manufacturers of book paper using clay for loading, and we got this rather interesting comment: Two of them said they used nothing but American clays. The other two said they used nothing but Leemoor's English china clay. Of the two biggest users of this group, one said, "We use American clays because we find we save about $35,000 a year on our wires." The largest user in the other group said, "We use English Leemoor china clay because we find we can save $40,000 a year on the wires." (Laughter) The interesting thing is that the Leemoor clay is a primary clay. Our clays south of Tennessee are secondary clays. We found that there was an appreciable difference between our Georgia, South Carolina and Florida clays which are the secondary clays in the apparent amount of grit. I ran a series of experiments under rather carefully standardized conditions; succeeded by continuous agitation in breaking up these clays so that they compared



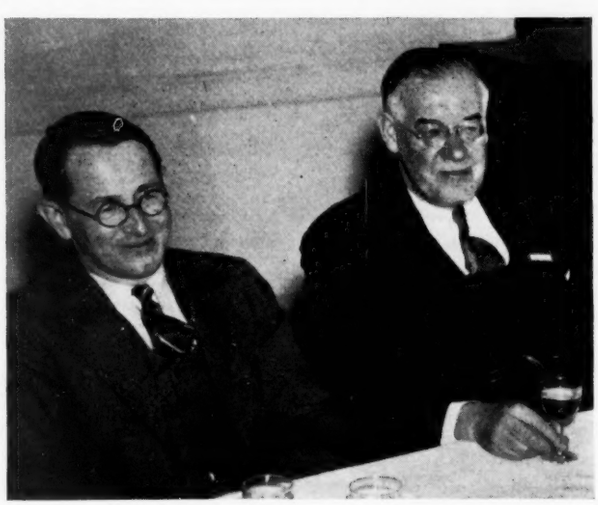
W. R. Maull and Edwin Sutermeister.

favorably with the very finest Leemoor clays. It was rather interesting, because we were attempting to determine (this was work done at the Bureau of Standards some several years ago) what it was that the paper industry required, more particularly for loading clays and not so much for coating clays. A number of mills that have ceased to use English china clays have gone almost exclusively to the American clays. I have had no experience with American clays in the last five or six years, but prior to that the chief criticism of American clays was of high grit, and it was not so much actual grit as the fact that these fine particles, having been under pressure for so many years, had almost become a solid particle, the fine particles tend to agglomerate, and it takes a considerable amount of plunging in order to get them broken up.

Mr. Traquair: I have been asked under the Raw Materials Division to prepare purchase specifications for several of our chemical raw materials. We had a short conference or meeting on lime as a chemical. It is used in the paper industry very largely, and so far there are only A. S. T. M. specifications for lime, for cooking rags and straw and for the sulfite industry. Lime, as a chemical, is also used in making bleach, in causticizing carbonates, and also where the carbonate produced is to be used as a filler in paper. Each of these three uses will call for a special specification. As Dr. Withrow pointed out at the meeting, the lime producers consider lime as lime, and if it makes a decent mortar to lay bricks, it was perfectly good lime. The lime producers are very insistent that lime from Tennessee and lime from Mitchell, Indiana, or from Toledo, Ohio, or from anywhere else is all the same—it is lime, and they are somewhat shy of specifications.

Mr. Maull: Coming back to clay, can't we draw one conclusion: the reason the domestic clays are increasing, and increasing tremendously, over the past few years, at the expense of English clays, is the research conducted by the domestic clay industry? Four years ago I had occasion to try to get certain information on English clays (it was very scanty) from a use requirement approach. The chemical industry making the greatest progress is the one that is putting its efforts

Allen Abrams and M. A. Krimmel.



Right, C. E. Curran and John Traquair. Mr. Curran was erroneously identified as G. K. Spence in the first instalment of this article in our May issue.

into the research to apply their products to the application end in our industry.

Mr. Haynes: There is no doubt that the tendency of research in the chemical industry is more and more towards uses.

Facts and Fables

Mr. Clark: This thing has been very interesting to me: We recently have been sweetening up our paper with sugar. The salesman will tell you the advantages of adding sugar to your paper and present definite, concrete data as to what that will do. The other extreme—and I often think of it—is the lubricating industry. The lubricating salesman comes around and he says, "I represent XYZ Company. We are the biggest company in the world under one roof."

Mr. Schuber: I had an experience about three months ago when a paper mill superintendent told me that by putting sulfuric acid in his beaters he could prevent curl. (Laughter) I will swear that they tried that in three of our mills and it worked. (Laughter) That is a fact, gentlemen. You might not believe it, but it is a fact, it was actually used in operation, ton after ton.

Mr. Clark: We had a superintendent one time who was very celebrated for his manufacture of alkali and acid proof paper. After he died, we found out that his formula was to add ten carboys of vitriol and one thousand pounds of soda ash (laughter) and four thousand pounds of lime, to a ten thousand pound charge of rags in a bleach boiler and it worked.

Mr. Haynes: Well, gentlemen, I think we are going to have a very interesting manuscript. (Laughter)

Industry's Bookshelf

Planning Under Capitalism by A. W. Rather, 199 pp., P. S. King & Son, London, 9s.

By "planning," Rather means the attempt to control the progress of needed economic change. The case against planning is stated, with an earnest plea for a return to liberal capitalism. Descriptive analyses of important examples of planning in large industries are outlined, and one is impressed by the trend toward closer cooperation of government with industry in Great Britain.

The Fundamentals of Money by Henry Houston, 221 pp., P. S. King & Son, London, 10s.

Houston offers his book as a step toward solution of international monetary problems. Here is no abstruse thesis, any more than it is a superficial summarization of popular beliefs. A survey that relates primarily to the London money market, it is of no less importance to the harried American striving to show a profit.

What The International Labor Organization Means to America edited by Spencer Miller, Jr., 108 pp., Columbia Univ. Press, $1.50.

Recent entrance of the U. S. Government into the International Labor Organization at Geneva prompts this prominent educator to collect important writings by prominent authorities. The mechanics of international labor standards are explained, origins and program of the I. L. O. discussed, and the significance of American membership pointed out. Miller himself concludes this valuable book with a survey of last year's activities.

Rayon and Synthetic Yarn Handbook by Dr. E. W. K. Schwarz and Herbert R. Mauersberger (2nd Ed.), 558 pp., Rayon Publishing Corp., $3.75.

Here is a practical handbook for producer, manufacturer, distributor, or dry-cleaner. Technical and economic problems of the rayon industry are vividly outlined by experts in the many divisions of the field, and 230 illustrations, charts and tables add to the clarity of the text.

Physical Chemistry for Colleges by E. B. Millard (4th Ed.), 524 pp., McGraw-Hill, $3.75.

Millard has re-written his text in line with recent important advances in such topics as solids, ionized solutes, chemical equilibrium, kinetics, and atomic structure. New material has been selected with care and makes this edition more valuable.

Solutions of Electrolytes by Louis P. Hammett (2nd Ed.), 238 pp., McGraw-Hill, $2.25.

Originally written in the belief that qualitative analysis was the ideal medium for studying the physical chemistry of electrolytes, Hammett has revised his text to incorporate the present theory of the ionization of acids and bases. None of the simplicity that characterized the first edition has been lost.

Electrolytic Oxidation and Reduction—Inorganic and Organic by S. Glasstone and A. Hickling, 420 pp., Van Nostrand, $9.

An up-to-date summary of electrolytic knowledge. Both industrial and research viewpoints are preserved; full references to scientific and patent literature are included, and the authors indicate how the manufacturer may employ fundamental principles in his plant rather than unsatisfactory empirical methods.

Practical Boiler Firing by H. C. Armstrong and C. V. Lewis, 132 pp., Lippincott, $1.50.

A handbook for "stokers, students and boiler superintendents," written with the well-grounded belief that there is urgent need in industry for a more intelligent use of coal. The clear analysis of essential factors in boiler control will aid the plant man in securing better efficiency.

Welding Technology and Design by G. F. P. Fox and F. Bloor, 90 pp., Lippincott, $1.50.

As process industries' equipment requirements become more exacting, fabrication problems become more complex, and this introduction to the welding art should be suggestive to the designer of modern equipment. Text includes welding methods, use of arc welding, and applications in important industries.

The Microtechnique of Inorganic Qualitative Analysis by A. A. Benedetti-Pichler and W. F. Spikes, 180 pp., Microchemical Service, $3.

A systematic, workable text on microanalysis. Previously available procedures have in some cases been simplified, and recent information has been summarized and arranged for practical use.

The Chemical Formulary (Vol. III) edited by H. Bennett, 566 pp., Van Nostrand, $6.

A storehouse of practical information. These condensed formulas for thousands of products in many industries have been collected by nearly fifty experts in many fields. Bennett's first two volumes are already well-known and this third collection adds greatly to their value.

Specially Designed Equipment

By William Spooner, Jr.

Spooner and Kriegel

WHEN individualism was really rugged, standardization was an idealist's dream. Each separate plant was run according to the ideas of its management and ideas as to equipment were as individualistic as the choice in neckties. Even boilers were likely to be of specific design. Electric power and the tremendous technological advances of the past half century led a long swing in the opposite direction, which is not without its bad aspects.

The X Y Z Soap Company, making household and toilet soaps, may well use crutchers, frames, glycerine stills, etc., of standard design, exactly similar to the equipment at the A B C Soap Company, because processes and products are virtually the same. Every justification exists for such standardization, for an industry inevitably develops equipment embodying past experience and leading to the best production economy and efficiency.

Suppose, however, one of these imaginary companies produces a new sulfonated oil shampoo, involving rather delicate blending and heating operations at one stage of production. It could take a standard type of jacketed mixer and adapt its design and operating characteristics to the special production problems involved in the new shampoo. In the end, a shampoo would be successfully produced but either the process or product would have had to be modified, in which case the possibility of developing a really outstanding new shampoo might be put in real jeopardy, or the equipment would be so modified and adapted as to become, for all practical purposes, a specially designed unit.

No one who has gone through that mill will question the statement that the cost of empirical redesign of existing equipment on the job, even when completely successful, is far more than in providing from the start suitable specially designed equipment.

Illustrations document the considerations presented here. Generally speaking, these pieces of equipment are not radically different from standard units. They represent no very startling departures from normal. They do embody, however, design or construction which definite operating conditions demanded.

Users of beeswax and other waxes are accustomed to wax in the form of cakes of various sizes. These

Figure 1. Special shredded wax machine for producing wax shreds from melted wax.

cakes, convenient enough from the packing and shipping viewpoint, were not as practicable as they might be in process use. Cake requires longer to melt than in flake or similar finer divided form and are harder to proportion properly in smaller batches. The problem of special design in this case was to devise a means of processing in some form for easier melting without complicating the packing problem. It was determined that a shredded form would be ideal but, logically

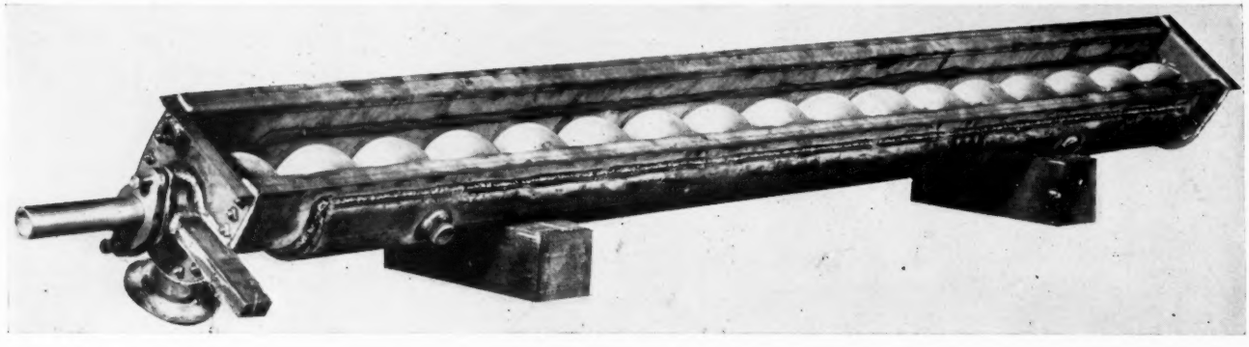


Figure 2. Jacketed stainless steel conveyor-mixer.

enough, did not want to melt wax, form it into cakes and then shred it, though ample equipment was available for the purpose. A machine to take melted wax and produce wax shreds was required.

Careful study of the essential requirements resulted in the unit shown in Fig. 1. No startling new principles were utilized. The machine is simple and practical, doing well the exact job for which it was intended. No standard unit on the market meets the process demands as efficiently as this specially designed unit.

The jacketed screw conveyor, shown in Fig. 2, is for mixing and conveying corrosive chemical fluid at temperatures above normal. Standard screw conveyors might have been adapted to this need, except that stainless steel was called for and peculiar charging and discharging had to be met. The special design avoided

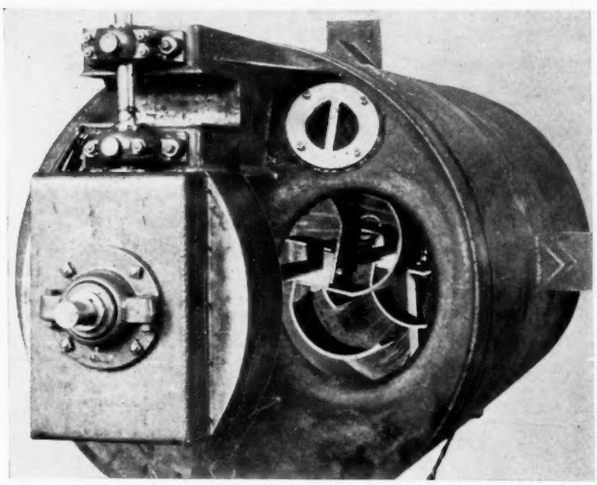


Figure 3. Special oil emulsion mixer.

the extra costs inevitable had a standard unit been adapted, even assuming that stainless steel construction had been available.

This special equipment provided exactly what was needed with the superior advantage of all welded construction, with an integral steel jacket around the stainless steel shell. This extra rugged construction was particularly valuable under the severe service conditions the machine had to face in a pilot plant.

Fig. 3 shows a welded steel mixing tank with novel yet simple agitators. Without discussing the kind of motion imparted to the certain special oils mixed, it is sufficient to state that thorough agitation was necessary to maintain an emulsion not obtainable by ordinary methods. The agitator blades are simple in construction and are easily replaceable. The cone bottom of the mixer, welded doubly to the cylinder shell, provides virtually a one piece type of construction.

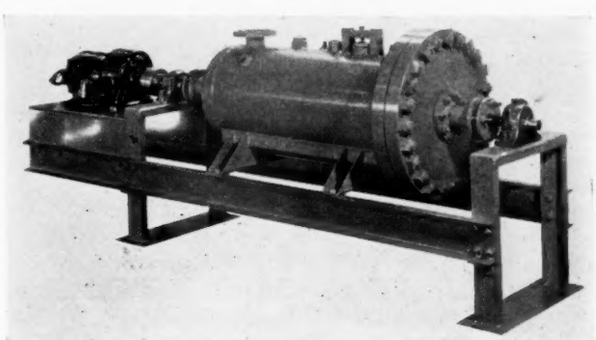


Figure 4. Pressure reaction vessel.

Fig. 4 shows a special pressure reaction vessel to operate at a maximum pressure of 300 lbs. per sq. in. and at a maximum temperature of 700 degrees F. The stationary steel shell has a bottom jacket, welded in place, for steam or hot oil. The charge is agitated by rotating blades set vertically on the shaft. Ordinary mixers or autoclaves would not meet the needs of the special process for the conditions required. Rugged, permanent construction was obtained by welding.

Fig. 5 is an aluminum varnish kettle for cooking special formulas. The shell is ⅜ in. commercially pure aluminum, welded to a ½ in. bottom. Swing bolts make it easy to remove the cover quickly and to seal the kettle tightly. Outlets in the cover are for charging and for the introduction of compressed air, which discharges the varnish from the bottom of the kettle through a perforated aluminum pipe, the upper end of which is shown at the right. The problem, solved here,

Figure 5. Aluminum varnish kettle.

was to provide aluminum in the rugged form required for varnish cooking, while conforming to the usual handling methods in such work.

Fig. 6 is another special mixing unit, designed for the progressive heating and mixing of a product readily damaged by overheating at early stages in processing. Possibility of contamination made stainless steel essential in the reaction vessel. Note the welded jackets for

steam and the large charging chute, also of stainless steel and welded into place.

The agitators are especially interesting. At the bottom of the shaft is a stainless steel scraper which makes close contact with the shell. Above this is another flat bladed scraper-agitator, for keeping the sides of the vessel in the heating zone clean of deposited material. Above this is another agitator of the same general design as the one shown in Fig. 3.

Building specially designed equipment involves a radically different procedure from that employed with standard equipment. In the latter case the maker designs and constructs the equipment without actual reference to the exact needs of the ultimate user, who, in his turn, simply chooses a size and type to meet his needs. In the former case the user determines exact requirements of his process involving the need for special design, and user and maker cooperate in the design of the equipment required, followed by suitable construction. The newly created equipment is truly a cooperative product obtainable by the experience of both user and maker.

Figure 6. Jacketed agitator for oils.

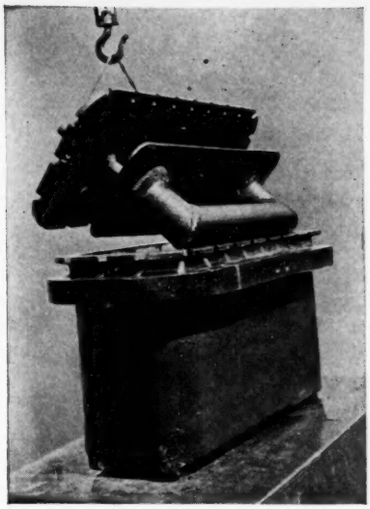
Worthwhile contributions by any maker of equipment along these lines must be drawn from ample past experience in the adaptation of special methods of design to special needs and in the use of the various special materials of construction available to meet definite processing requirements. The more extensive the manufacturer's experience, the greater the likelihood that the definite performance required will be obtained. More than this, important in the production of satisfactory special equipment is the degree to which the maker can undertake the entire job of producing these units in his own plant. Where every phase of production of a special unit involves not only special design but special attention to every detail of production, the facilities of the producer are of vast importance. The ideal plant for special equipment must have a well equipped machine shop, sheet and plate shop and, above all, a completely modern welding shop with all types of up-to-date welding machines available, as well as highly trained personnel.

Moreover, special process equipment is bound to embody detailed knowledge, experience and facilities in the fabrication of all the special alloys available for specific performance characteristics. However much the maker of these alloys may know about their application, the prospective user must count on the practical experience of the fabricators of these alloys to avoid wrong combinations, mistakes in heat treating, machining, polishing, etc. The better equipped the fabricator is in such accessory services as galvanizing and tinning, stamping and pressing metal, laboratory testing and the like, the more apt is the finished special machine or equipment to meet the requirements of the user.

No one can question the value of standardization where it is economically and practically sound. On the other hand special design and construction is an absolute necessity for many old as well as new processes. From the special designs of today, tried out and proven, come the new standards of tomorrow.

Reducing Radio Nuisance

Porcelain insulators serve as miniature broadcasting stations because the high-resistance contact existing between the copper conductor and the porcelain gives rise to arc-type 60-cycle charging currents. The solution is, paradoxically, to make the insulator more conducting, according to Westinghouse Electric, at least in the region of the conductor. A copper-oxide coating is applied to the insulator top during the process of its manufacture. This glaze is subsequently reduced to metallic copper by a chemical process and then given a coating of tin to protect it from abrasion, so that the conductor makes intimate contact with the porcelain and eliminates all arcing.

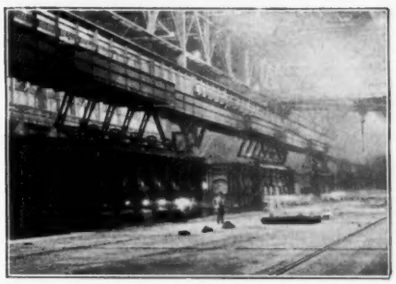


Strontium in Industry

By E. G. Enck

and

Gordon H. Chambers



Above, open hearth steel furnace. Opposite, retort for strontium metal production.

"THE rockets' red glare" of an old-fashioned Fourth is produced by strontium compounds. But strontium has a number of less spectacular uses. It connects with medicine, railway signal flares, ceramics, caustic soda, beet sugar, and steel.

Prior to the World War there was no strontium industry in the United States and strontium nitrate and other salts were imported chiefly from Germany. The war cut off the German supplies and late in 1914 Foote Mineral Company made the first large importation of strontium ore into the United States. Several chemical manufacturers began to produce strontium nitrate and as the demand increased strontium mines in the United States were opened. However, since the close of the war the domestic mines have not been worked.

The two principal ores are celestite, a natural strontium sulfate ($SrSO_4$), and strontianite, a natural carbonate ($SrCO_3$). From a commercial standpoint, celestite is the more important and supplies available are easily sufficient to meet any increased demand for strontium that can now be foreseen. Strontianite is, of course, a more convenient raw material; but its price is higher, and as a rule, it contains 7 to 20 per cent. of calcium carbonate combined in isomorphous form. For many purposes this calcium content is detrimental and so celestite remains the No. 1 strontium mineral. Typical analyses of the two ores are given below:

Celestite		Strontianite	
$SrSO_4$	96.55%	$SrCO_3$	90.9%
$SrCO_3$	0.17%	$CaCO_3$	7.5%
$BaSO_4$	0.25%	$BaCO_3$	0.1%
$CaSO_4$	0.54%	Fe_2O_3	0.05%
$MgCO_3$	0.15%	Al_2O_3	0.1%
$Fe_2O_3 + Al_2O_3$	0.90%	SiO_2	0.04%
SiO_2	1.38%	S	0.1%
		P	0.005%

British deposits of celestite are quite pure as shown by the above analyses, and, aided by low mining costs, they furnish practically the entire world production. Celestite has also been mined in Sicily, but the high transportation cost by pack animals to the port is said to prevent effective competition with the English. Transportation costs are also the principal reason why American strontium mines are inactive. As mentioned above, some ore was produced during the war but the known deposits in California, Texas, Utah and Washington are usually far from a railroad and this handicap, plus the long rail haul to eastern markets, is discouraging, in view of the cheap water transportation from England. Furthermore, much domestic ore is of poor quality. During the last few years English exports have amounted to about 4000 to 6000 tons annually, the greater part of which is shipped to beet sugar factories in Germany. The United States is the second largest consumer.

The best known deposits of strontianite are in Westphalia, Germany. This area has produced approximately 86,000 tons since the mines were opened in 1876 and the output is still about 1500 tons annually. Smaller tonnages are produced in Africa and a fairly large deposit exists near Barstow, California. Both strontianite and celestite are imported to this country in lump form. The ores are then put through a rotary oil-fired dryer, the lumps are broken up in a large jaw crusher and powdered in a ball race mill so that the final product is so fine that about 90 per cent. passes a 325 mesh screen.

In the manufacture of strontium salts, strontianite is more valuable than celestite because of its solubility in the mineral acids. The nitrate can be prepared simply by treating strontianite with nitric acid, filtering off the insoluble residue and evaporating to crystallization point. It can also be ignited with coal, producing strontium oxide which, on treatment with water, forms strontium hydroxide. Due to the presence of calcium in most strontianite, it is desirable to use celestite for the production of pure strontium compounds. The method commonly used, on the continent, is to boil finely powdered celestite with sodium carbonate with the formation of insoluble strontium carbonate and water soluble sodium sulfate. The strontium carbonate thus produced can be further purified by dissolving it in a suitable acid and reprecipitating.

Another method employed for many years is to furnace in a rotary kiln powdered celestite and coal, reducing the insoluble strontium sulfate to the soluble sulfide. The furnace clinker is leached with water, the insoluble impurities removed by filtration and the desired strontium salt prepared from the sulfide solution.

The carbonate is made by treating the solution with carbon dioxide, while the nitrate is prepared by merely treating the sulfide solution with nitric acid and later crystallizing.

Other strontium salts, such as the oxalate, chloride, salicylate and bromide are usually prepared by treating strontium carbonate with the acid of the desired salt.

Industrial Uses

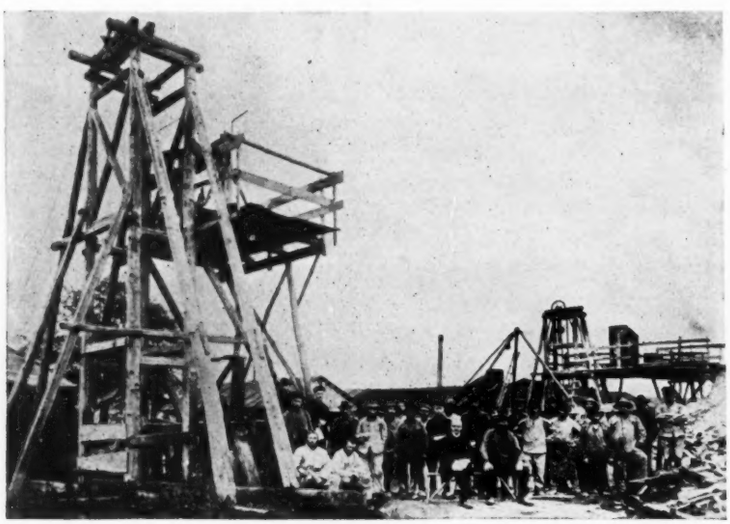
In processing sugar beets a molasses is produced containing about 50 per cent. sugar. This sugar cannot be recovered by crystallization because of numerous impurities. Over one hundred years ago it was discovered that insoluble saccharates can be formed with sugar and strontium hydroxide, and in 1849, at the suggestion of Debruanfaut, the use of strontium hydroxide was tried in a sugar refinery at Dessau. Many improvements have been made upon the original method and the present process, originated by Scheibler, is used extensively on the continent. At one time there were eight factories in Germany alone using the strontium process. Briefly, the molasses is treated at elevated temperatures with a 50 per cent. solution of strontium hydroxide which forms an almost insoluble strontium saccharate. After removing this precipitate by filtration it is mixed with water and decomposed by passing carbon dioxide through the solution, thus forming insoluble strontium carbonate, and the sugar remains in solution, later being recovered by crystallization. The strontium carbonate is regenerated by calcination to the oxide and then dissolved in water, forming the hydrate. It is estimated that the recovery loss is five per cent. The strontium process is not employed to any great extent at the present time in the United States.

Several American and foreign patents have been issued recently on modifications of a caustic soda purification process which is said to have been used secretly in Europe for many years. It has been noted that some strontium compounds have a tendency to precipitate silica, iron and manganese from concentrated caustic soda solutions. Antedating these recent patents, a series of tests were conducted in the Foote laboratories using a 50-55 per cent. sodium hydroxide solution saturated with an iron salt. On the addition of 1 per cent. by weight of strontium sulfate, the original iron content of the solution was reduced from 0.0056 to 0.0002 per cent. This treatment was of two hours' duration at room temperature. Additional tests seemed to indicate that as the temperature increased up to 80° C. the percentage of iron and manganese was decreased. Further tests were made with a 50-55 per cent. solution of sodium hydroxide saturated with a manganese salt. On the addition of strontium sulfate, the manganese content was reduced from 0.0024 to 0.004 per cent.

Experimental Data Obtained on the Treatment of Sodium Hydroxide with Air-floated Strontium Sulfate

Iron Content of 50-55% NaOH	Weight of $SrSO_4$ added to NaOH	Fe content after treatment at 50° C. for 15 min.	Fe content after treatment at 50° C. for 45 min.	Fe content after treatment at 20° C. for 2 hours	Fe content after treatment at 80° C. for 2 hours
0.0056%	Theoretical	0.001%			
0.0056%	1%	0.0006%			
0.0056%	2%	0.0006%	0.0004%	0.0002%	0.0023%

The fireworks industry deserves considerable credit for efficient smoothing out of the fluctuations in a highly seasonal business. As the sale of penny fireworks declined in recent years, the manufacturers offset the loss by increasing the use of exhibition fireworks at bathing beaches, amusement parks and other public places. Skillful merchandising also created industrial uses such as motion picture flares, airport flares, new types of ship signals, parachute signals, airplane landing flares, military rockets and parade torches. In all of these types of pyrotechnics strontium nitrate or carbonate is usually the major ingredient. The characteristic red flame of strontium is more arresting than the colors produced by other oxidizing agents and it also has greater visibility. A typical "Red Fire" formula contains 57 per cent. strontium nitrate, 29 per cent. potassium chlorate, 12 per cent. shellac or gum, and 2 per cent. of a fuel such as charcoal or sulfur. Strontium nitrate is somewhat hygroscopic and, therefore, in fire-



A strontianite mine in Westphalia, Germany.

works such as "dipped sticks" where the mixture is exposed to the air, it is customary to substitute strontium carbonate for the nitrate. In order to get a good red color it is important that all pyrotechnic ingredients be quite free of sodium and that a chlorine compound be present in the mixture. Two years ago the Foote laboratories intensified the flame coloration and lowered the melting point of strontium nitrate by adding lithium nitrate. However, the cost of this unusual double salt outweighed its advantages.

The United States Army uses a rather high percentage of strontium in tracer bullet compositions, as the red flame is more discernible, particularly in daylight.

The largest field for strontium nitrate is in railroad fusees. Every rear-end brakeman is obliged to use these red flares as a protective signal at night and in some states truck drivers are required to carry similar strontium nitrate flares to warn motorists on dark roads of a stalled truck. Consequently the production of fusees or flares is comparatively large and steady. It is surprising to note that at the present time the great bulk of strontium pyrotechnics is used for commercial and protective purposes rather than for amusement and destruction.

Strontium Metal and Alloys

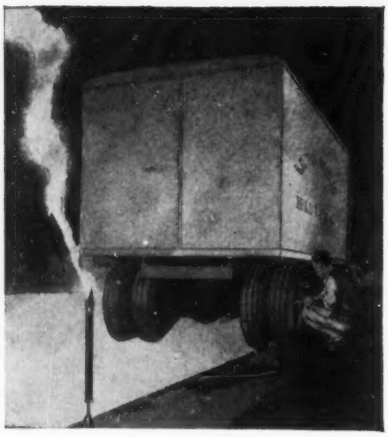
Strontium has been used medicinally for many years, and considerable quantities of strontium are still used in the pharmaceutical fields. However, its use has become less important, as indicated by the constant omission of the several strontium salts from the Pharmacopoeia. The only official salt at the present time is the salicylate. It is used for rheumatism in place of the sodium salt on the theory that it is less irritating to the intestinal tract and milder in its action. Strontium bromide was found to increase the amplitude of the intestinal contractions. The bromide is also used extensively as a nerve sedative in treating nervousness and hysteria and the iodide in heart ailments.

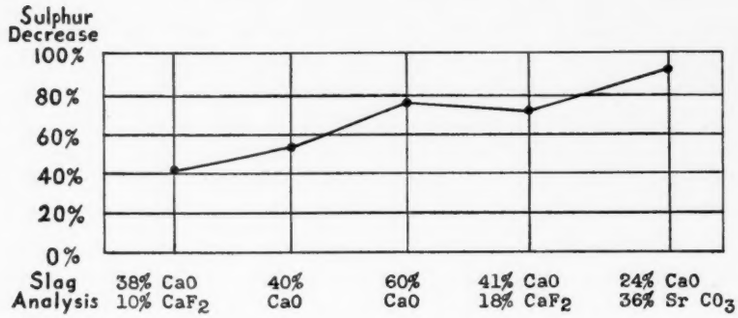
Strontium metal has been used less than the other alkaline earths, barium and calcium. It can be manufactured electrolytically, using a fused bath of strontium chloride and ammonium chloride. It has also been produced in moderate quantities by the thermit reduction of strontium oxide and aluminum metal, later distilling the metal under high vacuum and condensing it on a cooled electrode. This method yields a pure product containing over 99 per cent. strontium metal. The metal has a white metallic luster when freshly cut but oxidizes upon exposure to air and reacts quite vigorously when dropped into water. Some years ago considerable interest was shown in strontium-magnesium alloy as a getter in radio tubes. However, this alloy was later replaced by a barium-magnesium alloy as the barium alloy was more active in combining with the residual gases in the vacuum tubes. A recent patent has been granted for a lead alloy containing 0.2 to 0.6 per cent. strontium and 0.2 to 2.0 per cent. tin suitable for storage battery anodes. Strontium is also said to give desirable properties to nickel alloys and is also valuable in aluminum and copper. Attempts have been made to deoxidize copper by the addition of small quantities of strontium metal during the melting stage, but tests showed very little improvement in the working qualities of the metal unless it was annealed in an atmosphere of hydrogen.

A few years ago a private source reported that strontianite had been used in a secret process for thirty-five years by a leading German manufacturer of high-grade alloy steel. Recently other German and English producers have adopted the use of strontianite to aid in desulfurizing their best grades of basic open hearth steel. Several American companies have tried the process and their results were rather encouraging.

European metallurgists seem to agree that the strontianite acts as a flux or thinning agent, producing for long periods of time a highly fluid, strongly basic slag. Fluorspar has somewhat the same effect on slags but it attacks furnace linings and is less effective in removing sulfur. Strontium oxide, being quite basic, is much more energetic in eliminating both sulfur and phosphorus. In 1929 C. E. Wood and T. L. Joseph of the U. S. Bureau of Mines showed that desulfurization varies directly with the molar basicity of the slag and the excellent results obtained by some steel plants with

Celestite in English warehouse.





Left, truck using strontium flare.

Right, abstract mentioned below.

strontium substantiate their theory that a highly basic slag is best, particularly if it is liquid enough to allow thorough reaction with the metal bath. A graphic example of the efficiency of strontianite is shown in the abstract above from "Stahl & Eisen" 1932, No. 24, page 577.

These results show that a highly basic slag, particularly when strontium is used, is the best for desulfurization. In this test the strontium slag is about 40 per cent. more efficient than one of ordinary composition.

The usual practice in Europe is to add strontianite equal in weight to 1 per cent. or 1½ per cent. of the charge in the furnace, the addition being made as soon as the charge has melted. For example, in a typical English open hearth heat the first analysis showed 0.072 per cent. sulfur and 0.250 per cent. phosphorus. An hour later strontianite was added and two hours after the strontium addition, the sulfur had dropped to 0.027 per cent. and the phosphorus to 0.036 per cent. The final analysis of the heat was 0.027 per cent. sulfur and 0.030 per cent. phosphorus.* Rather large tonnages of strontianite are now being used by German and English steel plants but in this country the use is quite limited.

For some years fluorspar (calcium fluoride) has been the principal flux used in the coating on stainless steel welding rod. Naturally the fluorine fumes given off during welding were injurious to the welder and consequently various manufacturers have tried to produce an efficient welding rod without calcium fluoride. It would therefore appear that if strontium carbonate is an excellent substitute for fluorspar in open hearth steel, that it might be equally satisfactory for an analogous use in welding rod. Slag tests were conducted using a standard coating for stainless rod, one sample containing calcium fluoride and the other strontium carbonate. The strontium carbonate slag was thin and fluid with apparently all of the advantages of fluorspar but none of its harmful effects on the health of the welder.

In England, strong efforts are being made by strontium producers to substitute finely powdered celestite for barytes as a filler or extender in products such as "paint, gramaphone records and rubber." In comparative tests it was found that strontium sulfate is a better filler for rubber than barytes or precipitated barium sulfate as it was least detrimental to natural aging. Celestite has a uniform oil absorption, is inert and has a lower specific gravity (3.95) than barytes. These undoubted advantages are offset in some cases by its buff-pink color and its slightly lower index of refraction. A standard grade of air-floated 300 mesh celestite is produced in the United States.

Strontium carbonate has been tested thoroughly in enamel, glass and ceramic glazes and produces excellent results in all three. However, as it seems to have no outstanding advantage in comparison with barium and calcium carbonates, its use in ceramics has been limited. A double precipitate of barium and strontium carbonate was used for some years on the filament of almost all radio tubes. In the near future the American public may not only be paying installments on radios which contain strontium but also on refrigerators containing this element. When crystalline strontium chloride is dissolved in water, heat is absorbed and the entire solution becomes cooler. Fortunately these strontium chloride freezing mixtures give temperatures of a few degrees above 0° F., and thus can be used to maintain uniformly low temperatures in refrigerators. Another use for strontium in this growing field is its property as an ammonia absorbent in refrigeration. The patent literature contains a number of other special uses. Strontium hydroxide has been patented as a depilatory and strontium peroxide has been tried in toothpaste. The climax is reached with a patent which earnestly recommends putting strontium nitrate into corned beef.

Strontium has not advanced as much as many other elements in the recent chemical march of progress. However, as described above, a number of large new uses have been in the development stage for some time and the chances are that some of these will blossom forth on a large scale. We don't know where the lightning will strike—it may be strontium-treated steel, a new strontium refrigerant, or something quite revolutionary.

* Much of the information on the use of strontianite in steel was obtained from E. Doehler, German metallurgist and open hearth steel consultant.

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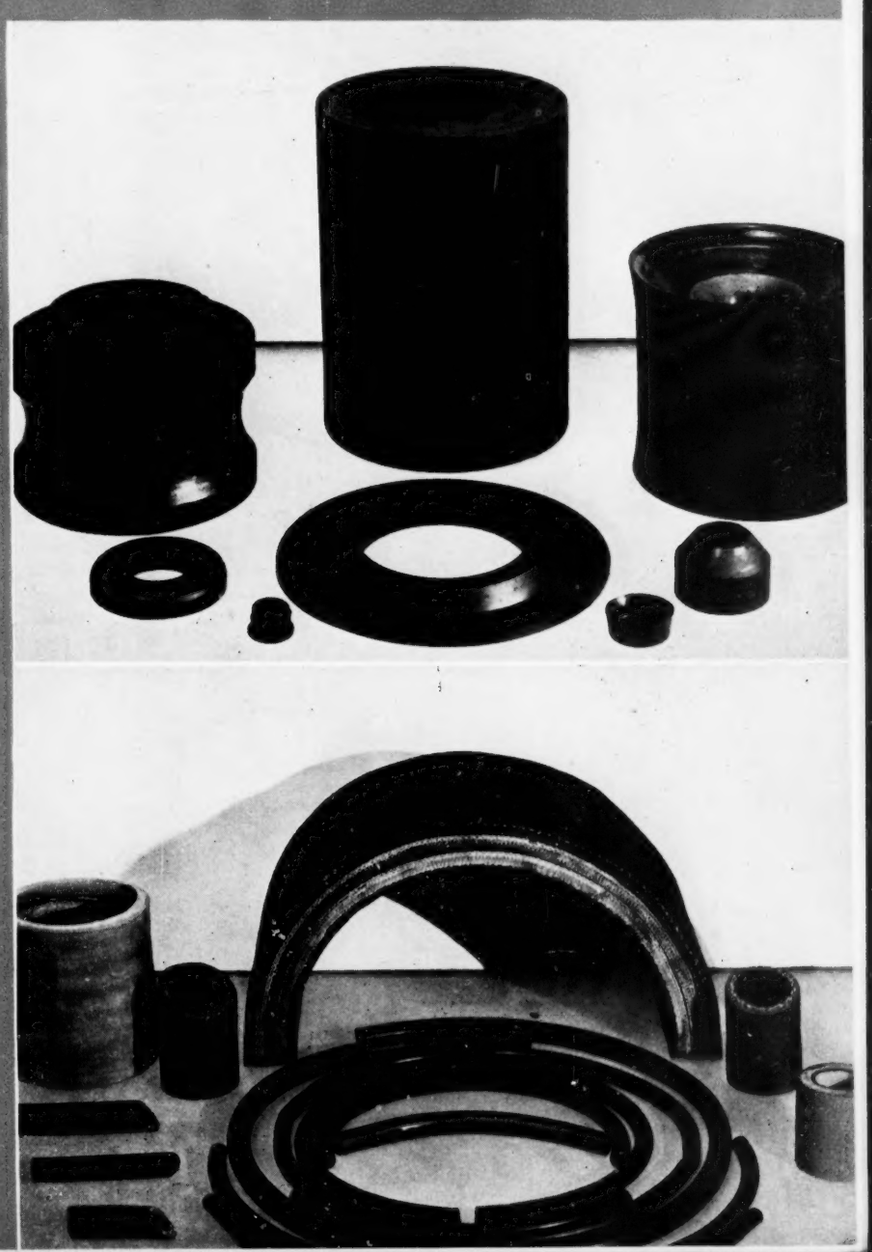
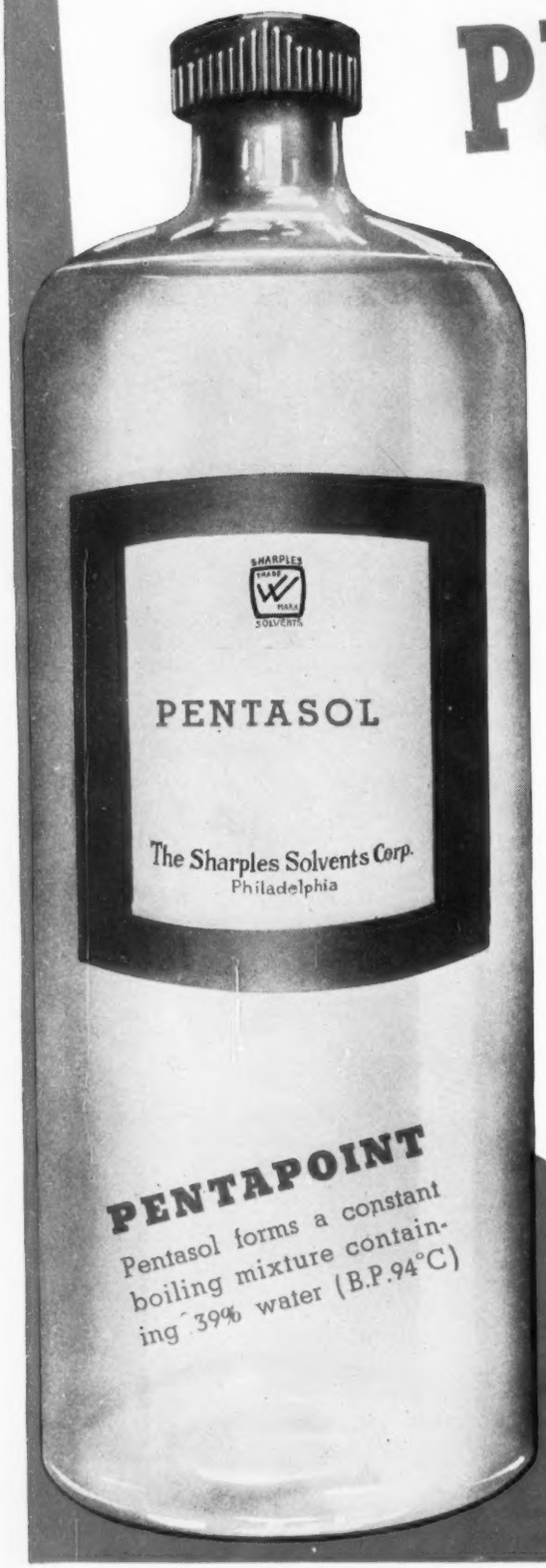
New Products and Processes

A Digest of Chemical Uses and U.S. Patents



DuPrene, du Pont's synthetic rubber, finds a number of applications in industry where natural rubber is unsatisfactory.



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(PURE AMYL ALCOHOLS)

Pentasol needs no introduction to the lacquer industry. Together with Pent-Acetate (the acetic acid ester of Pentasol), it is being used in steadily increasing amounts by leading manufacturers of quality lacquers.

Pentasol and its derivatives have for years played major roles in the mining industry—in pharmaceuticals—as photographic reagents—in dye compounds—in textile chemicals—and in many other diversified fields.

The Sharples Research Laboratories will be glad to cooperate with you in adapting Pentasol, its derivatives and other Sharples Amyl Compounds to your particular problem.

PENTASOL SPECIFICATIONS AND PROPERTIES

Boiling Range	112-140°C
Specific Gravity @ 20°C	0.81—0.82
Solubility in Water @ 26°C	2.23 ml.
Water Dissolved @ 26°C	8.06 ml.
Surface Tension	37.7 dynes/cm.
Specific Heat	0.725 (approx.)
Latent Heat (Calc'd)	99.4 g. cal/g
Acidity	None
Water Content	None

PENTAPOINT

Pentasol forms a constant boiling mixture containing 39% water (B.P. 94°C)

*Pentasol (Pure Amyl Alcohol) • *Pent-Acetate • *Pentaphen (Para-Tertiary Amyl Phenol) • Dimethyl Ethyl Carbinol • Methyl Propyl Carbinol • Amyl Naphthalene • Triamylamine • Diamyl Sulphide • Amyl Mercaptan • Dichloro Pentanes • Iso-Butyl Carbinol • Amyl Benzene • Diethyl Carbinol • Diamylamine • Monoamylamine • Secondary Butyl Carbinol • Diamyl Ether • Normal Butyl Carbinol • Diamylene • Normal Amyl Chloride • Mixed Amyl Chlorides

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Farm Chemurgic Products

This department this month is devoted entirely to abstracts of papers of particular industrial interest read at the Second Farm Chemurgic Council, Detroit, Michigan, May 12 to 15.

Soy Bean Proteins

By W. J. O'Brien

Vice-President, The Glidden Company

PROTEINS are complex organic compounds found in both the animal and vegetable kingdoms. The chemical syntheses and many of their reactions are not clearly understood. The complex or conjugated proteins contain in addition to the amine acids several other chemical constituents including phosphorus, sulfur, carbohydrates and nucleic acid. In the class of complex proteins milk casein occurs. As is well known, milk is practically a complete food because the casein contains the essential acids, such as tryptophane, cystine, lysine, tyrosine, needed for maintaining normal growth. Milk casein therefore stands out as a definite chemical complex.

In contrast we have simple proteins such as the well-known commercial products, white of egg, gelatin, animal glue, etc. These simple proteins are classified as such because on hydrolysis they yield only amino acids whereas milk casein on hydrolysis will yield phosphorus compounds and amino acids.

In addition to proteins occurring in animal sources, there is another large source of proteins in the vegetable kingdom. These proteins are found in legumes such as soybeans and lentils, and also in nuts, such as peanuts, walnuts, etc. Of all known vegetables the soybean ranks among the first in protein content. For example, in the animal kingdom, eggs have a protein content of 14.8%, milk 3.3%, smoked ham 16.7%, round steak 20.5%, lamb 18.8% and veal 20.3%. In the vegetable kingdom: soybeans average between 35-40% protein, peanuts 25-27% protein, and walnuts 16.1%. In soybeans we have one of the most economical sources of protein.

Soybean protein, according to Meissal and Bocker, extracted from soybean meal contains approximately 89% of a protein characterized by the fact that it can be precipitated by cupric compounds, 1.6% vegetable albumin and 1.2% non-albuminoid nitrogen. The ultimate analysis of glycinin shows the following:

Carbon	52.12%
Hydrogen	6.93%
Nitrogen	7.53%
Sulfur	0.75%
Oxygen	26.3 %

Commercial Basis

To review the steps in the translation of our fund of scientific knowledge to a successful manufacturing program on a satisfactory commercial basis, it was first necessary to study the whole soybean industry from the handling of the bean through to the separation of the oil from the meal. This involved the introduction in this country of a commercial extraction process so modified as to render soybean meal with its protein suitable for extraction; and also to develop the chemistry involved in the isolation and separation of the protein, together with the engineering necessary to handle a large production. It further required the establishment of a tremendous research program. This work was commenced in 1932.

In 1935, after a successful operation of a pilot plant, a unit to produce five tons of soybean protein per day was built in Chicago. This plant was put in successful operation but was unfortunately destroyed in the fall of 1935. As a result of information obtained from this plant regarding certain engineering features, the engineers of The Glidden Company have re-designed a new unit which has now started in operation.

Stable Price

The cost of soybean protein to the consumer will not be greater than milk casein. It should enjoy the added advantage, however, that the price will not be subject to wide fluctuations experienced in the milk casein industry. Its cost of manufacture, of course, will be dependent upon the basic cost of raw material, which is principally soybeans, and the method of bookkeeping. For example, the three main ingredients involved are soybean oil, soybean meal and protein, and therefore the cost of soybean meal charged in to the operation will determine the cost of the protein. The cost of soybean meal on the other hand could be dependent upon the cost of beans over a period of years, the average selling price of oil and the selling price of meal, so that with reasonable production, soybean protein can be made to compete economically with milk casein. Other factors involved in the cost of soybean protein are the cost of chemicals, labor, overhead, etc. An increased production may easily permit of a slightly lower cost.

The Glidden Company manufactures three grades of protein, known as Alpha, Beta and Gamma Protein. The difference between Alpha and the Beta protein is largely due to the variance in viscosity when cut with alkalies, Alpha showing the lower of the two. The chemical analyses otherwise of Alpha and Beta protein are the same. Gamma protein, on the other hand, gives a low viscosity but analyzes approximately 65% protein on a dry basis.

The typical analyses of Alpha and Beta Protein are as follows:

Protein	88.79%
Fat	.03%
Moisture	8.56%
Fibre	.04%
Ash	.55%
Nitrogen free extract	2.03%

The physical characteristics of Alpha Protein are as follows:

Color	Cream
Fines	100% through 40 mesh 100% on 80 mesh
Pick Test	From 75-80, compared with
Milk Casein	about 40
Viscosity	MacMichael-37M, compared with
Milk Casein	250 M

Attention is particularly called to the very high pick test of soybean protein. By pick test we mean a measure of the adhesive strength. Because of the chemical methods of manufacturing, soybean is fairly free from fermentation.

As a result of the work by the Institute of Paper Chemistry, a new sizing process has been developed. Over 2,000 tons of paper were made experimentally at various paper mills during the last two years, resulting from the experiments carried on at the Institute under the direction of Dr. Rowland. These commercial tests demonstrated the potential possibilities for the use of tremendous quantities of protein in the paper industry. Certain types of pulp which heretofore have been very difficult to size, were successfully treated. Marked improvements in the characteristics of the paper sheet were shown; the Mullen strength in all cases was raised. The folding strength of the paper as well as the formation of the sheet

showed marked improvements. If the paper industry should generally adopt this sizing process and the trade demand a superior paper, it is estimated that this use alone in the paper industry would require from 14,000 to 15,000 tons of protein a year. There is active demand for paper coatings. The consumption of milk casein in 1935 for paper coating was approximately 17,000 tons. In past years there has been a considerable amount of this tonnage imported. This soybean development should make the paper industry in this country independent of outside sources of casein, provided the present duty is maintained.

Another very promising field for the use of protein is the paint industry. Soybean protein in kalsomine and paints is more weather-resisting and more stable than other types of protein. A new use is a surface primer for steel, which it is hoped will find a growing use in the protective coating field.

Use of soybean meal for the manufacture of glue has increased, particularly in the plywood industry. Preliminary work has shown that more effective results can be obtained from the use of pure soybean protein instead of meal. As a result of work done at the Institute of Paper Chemistry, a new waterproofing process has been developed. This use is particularly adaptable to water-proofing paper, containers, etc.

It is worth mentioning the large potential possibilities of soybean protein in foods. Experiments still in the development stage have shown that various flavoring compounds can be made from protein. It is felt also that there will be eventually a very big demand for soybean protein in the plastics industry.

In summing up it is safe to say that for this new industry there is a potential requirement of from five to ten million bushels of soybeans annually. The chemical development of the soybean protein should act as a stabilizing influence on the whole soybean industry by taking this product away from the soil and disposing of it for industrial uses.

Solvents on the Farm

By Charles L. Gabriel

Vice-President, Commercial Solvents Corp.

BUTANOL, acetone and ethyl alcohol from fermentation must compete with similar products of synthesis. Cheapness of farm products is essential to their use in increasing volume in chemurgic processes. Instead of bonuses to farmers for reducing acreages, encouragement to greater production with a benefit payment on surplus utilized industrially seems more logical. The industrial consumption of excess crops would in no way interfere with food prices but would furnish a means of logical and economically sound disposal of them. Farms carry fixed overhead costs in taxes, interest and maintenance. If on land otherwise bare, the farmer would raise crops for industry, the return above actual direct cost would do what all plans of farm relief propose to do — increase farm income. Additional employment for farm labor would be created and industry would materially benefit. Raising special crops sold cheaply for industrial use would assist in the solution of two vexing problems, farm income and farm employment. Such a plan, fundamental in industry for generations, involves an appreciation of quantity production in cost reduction and requires consideration of total income as more important than unit prices.

Industry is ready and willing to carry out its part in the program of economic betterment of agriculture by consuming the farm products in its operations. Industry alone cannot do the job. Farmers must be persuaded to direct their purchases toward products made by the use of agricultural raw materials. Such a demand can come from farmers themselves. They of all people are vitally interested in increasing and widening the markets for farm products.

Potash, Fertilizers

By J. W. Turrentine

President, American Potash Institute

IN growing industrial crops, the same principles apply as in growing food crops with the important addition that crop standards will receive more attention, as the manufacturer will be much more exacting in his requirements than the casual purchaser of food. This is already being demonstrated, notably, by tobacco, and crop-feeding methods that influence quality will have to be given more intensive study.

Thus, through cellulose development, potash lends rigidity, and through the thickening of cell walls, it promotes disease and pest resistance and the keeping qualities of the fruit. Its presence in plant juices reduces frost damages and through its aid in nitrogen assimilation, it promotes early maturity. But outstanding among the rôles which potash plays is the promotion of carbohydrate synthesis. The literature contains data establishing the role of potash in increasing the starch content of the potato, the yield of corn per acre, the increase in the oil content of the cotton seed and the development of cellulose fibre in the plant stem. Twenty-one million acres of corn for power alcohol means a tremendous yield of carbohydrate.

Modern chemical and bio-chemical methods have now been developed, whereby the crop foods actually available during the immediate growing season, as contrasted with those present but locked up in non-available forms, can be quickly determined and correlated, with satisfactory accuracy, with crop response. These methods afford a means whereby one can predict in advance the crop food present and knowing the crop requirement, the quantities of each that must be added to obtain an economic return. Such surveys are eloquently illustrated by the recent one of Professor Bray, of Illinois, who has analyzed the principal soil types of his state and charged them on the map, showing areas of potash abundance and potash deficiency. What is needed is a similar map for the agricultural areas of the United States, not only for potash, but for the other crop foods as well, including lime, magnesia and sulfur. Such a map would be invaluable as showing logical areas for Farm Chemurgic enterprises, as likewise for the activities of crop-food distributors. It is idle to contemplate the establishment of industrial enterprises with a view to permanence, depending on the farm crops to be raised on soils that are already showing crop food deficiencies without full regard for sources of fertilizer supply deliverable at feasible costs.

It is as important, perhaps more fundamental, for the Farm Chemurgic Council to concern itself with soil fertility as with chemical utilization for the two are linked together.

There is no known method of building up crop-food supplies of phosphates and potash other than that of applying them to the soil as commercial fertilizer. Nitrogen may be synthesized into usable forms, but not phosphates and potash. While nitro-

gen is available from many coke ovens strategically located with respect to agricultural areas and is deliverable in high concentrations and therefore at relatively low transportation costs from nitrogen fixation plants, the farmers east of the Rocky Mountains are largely dependent on phosphates from Florida and Tennessee and on potash from California, New Mexico and Europe. Delivery costs aggregate a very large sum, financed ultimately by the consumer of farm crops. It is equally obvious that this sum is to be reduced with increase in concentration of the commodities shipped.

We are now in an infinitely better position to cope nationally with the universal problem of soil restoration than ever before in agricultural or industrial history. We have seen agricultural nitrogen reduced in price to its unprecedented level of $1.25 per unit and potash to 45 cents per unit. From the low nitrogen concentration of 16% in sodium nitrate and 20% in ammonium sulfate, we now have cyanamid 22%, urea 46%, ammonium nitrate dissolved in liquid ammonia 55%. A large tonnage of nitrogen now reaches the farmer as a constituent of superphosphate. Potash is now abundantly available in concentrations as high as 62%; phosphates are obtainable in concentrations as high as 47%. Mixtures containing as high as 40% plant food are now being purchased in considerable tonnages—although unfortunately the 12% grade still predominates.

Industrial Uses of Wood

By Dr. H. K. Benson

University of Washington

IN transforming logging and saw mill wastes into commodities some interesting products have resulted. The processing of wood into products that take the place of lumber may consist of heating the finely divided wood with high pressure steam and suddenly releasing and exploding the wood into small fibers which in turn may be compressed as in masonite into boards of various degrees of density and uses. It is possible to defiber wood mechanically and to add certain adhesive agents to form boards and panels for construction and other uses.

In the west several new products have recently appeared. Saw mill waste is shredded and stirred into a slurry of waste magnesia recovered from calciner stacks by a Cottrell apparatus and sulfuric acid made from waste smelter gases. The mineralized fibers are formed into panels or squares and are not only efficient for acoustic uses but also very attractive for interior walls. By high pressure briquetting machines sawdust is made into the semblance of a log about six inches in diameter, its surface waterproofed, and the product has proved very attractive for fireplaces. The same principle is being studied for compressed wood for boards and molded forms.

Prior to 1927, the use of West Coast hemlock for lumber was outlawed by its property of splitting and checking. In 1927 pulp mills began to utilize cheap hogged fuel and cheap raw material supplied by Western spruce. Chemists studied the pulping of hemlock and made from it a pulp of very high alpha content. Pulp is now manufactured from this once despised species at the rate of 1,500 tons a day. It is in demand for rayon manufacture.

The way has been opened for interesting possibilities of wood as a raw material for the fermentation industries. By the use of selected cultures of organisms, ethyl alcohol, butyl alcohol, acetone or butyric acid may be produced.

Another major constituent of wood is lignin, the chemistry of which is still obscure. As the chief organic constituent of waste sulfite liquor several interesting applications of it have been found. In Sweden, extensively used as a road binder, it has given results comparable to petroleum road oils. Originally intended as a dust preventative, its successive application to roads has served permanent improvement, being less subject to freezing and heaving action than the oil surfaced highways. Two pulp mills in this state (Washington) now utilize the waste liquor of the sulfite process for road treatment.

Progress in Fertilizers

By Firman E. Bear

Director of Agricultural Research
American Cyanamid Company

OUR declaration of chemical independence resulted in the development of an enormous air-nitrogen industry capable of supplying all of our nitrogen requirements. Since the supply of air nitrogen is inexhaustible—there being 35,000 tons over every acre of soil—and since the capacities of our air-nitrogen plants can be expanded, the nitrogen problem seems to have been permanently solved subject only to limitations with reference to our available supplies of cheap energy.

We have also developed our potash deposits during and since the War to the extent that they now supply half our current needs. Our potash industry could readily be expanded to supply all our fertilizer requirements.

Our phosphate resources are far greater than the known phosphate deposits of all other countries combined. These deposits are so valuable that, next to the soil itself, they constitute our most important single natural resource. Recently a most important development has taken place in the mining of Florida pebble phosphate as a result of which the percentage recovery of phosphate in the mining operations has been greatly increased. The very finely divided particles, previously carried away in the water used in the hydraulic-mining procedure, are now in large part recovered by a very ingenious flotation process. The adoption of this process by the phosphate-mining industry is of extreme importance in the prevention of waste of our phosphate supplies.

The fertilizer industry is now truly a chemical rather than a scavenger industry. Fertilizer value is no longer judged on the basis of odor, color, or its content of organic matter. Properly-formulated complete fertilizers, made entirely of inorganic materials, produce effects superior to those secured by the use of organic mixtures. The choice of fertilizer chemicals now available is so varied that any special need of soil, crop, or climate can readily be met. Thus one can choose for his carrier of nitrogen nitrate of soda, nitrate of lime, nitrate of potash, or nitrate of ammonia; liquid ammonia, ammonium sulfate, ammonium nitrate, or ammonium phosphate; calcium cyanamid or urea. He can choose for his carrier of phosphoric acid superphosphate, ammoniated superphosphate, ammonium phosphate, di-calcium phosphate, calcined phosphate, or basic slag. For his potash salt he may select the sulfate, muriate, nitrate, or carbonate of potash, or one of the crude unrefined salts as it comes from the mine. Additional carriers of nitrogen, phosphoric acid and potash will no doubt be available for purchase in due course as a result of researches under way.

Lowered production costs are especially evident in the case of nitrogen materials. Nitrogen is available in a great variety of inorganic forms at prices less than half the pre-war cost of this element. This is significant since lack of nitrogen is

a limiting factor in crop production on more than half our farming area. Notable increased effectiveness of soluble phosphates has been secured by the granulation process as a result of which the competing power of the soil with the plant for applied phosphoric acid is very much reduced. Granulation reduces the necessity of row application and improves the efficiency of broadcast, plowed-under, or in-the-bed applications of soluble phosphates.

Elimination of excessive amounts of certain fertilizer constituents in ordinary fertilizer materials has also been successfully accomplished to the farmer's advantage not only as relates to the bulk of material necessary to be handled and the cost per pound of plant food, but also as relates to its effect on the soil. Two such constituents are the sulfuric acid radical of ammonium sulfate and the gypsum of ordinary superphosphate. Either or both of these are of value to plants under certain conditions, but the quantities of sulfates contained in low-analysis complete fertilizers are frequently from 5 to 10 times as much as crops require. The answer to excess sulfates has been found in the production of double superphosphates, containing twice as much phosphoric acid but only half as much gypsum; in treble-superphosphate, containing only a trace of gypsum; and in substituting ammoniated superphosphate or ammonium phosphate for a mixture of ammonium sulfate and ordinary superphosphate.

Essential plant foods in standard fertilizer mixtures can now be approximately doubled without sacrificing efficiency. Thus large tonnages of 10-16-14 and 8-16-16 are now being sold to the potato growers to replace the old 5-8-7 and 4-8-8 analyses. These high-analysis mixtures, when properly formulated, are superior in effectiveness to the lower-analysis mixtures. Their use means enormous savings in freight and handling charges since only half as many pounds of fertilizer are required. These savings are of particular interest to growers in those areas where the applications of standard mixtures are a ton or more per acre.

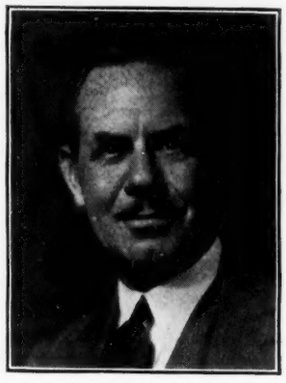
Organic materials have buffer effects on the soil; they contain small amounts of what are known as trace elements; and they leave a usually harmless residue in the soil. It has been found possible to duplicate the good effects of organic materials, and to add to these certain superior effects of inorganic materials, by including dolomitic limestone in the fertilizer mixture and by adding small amounts of the trace elements manganese, zinc, boron, and copper. While organic matter is an essential constituent of soils, the amount added to the soil in the ordinary fertilizer mixture is insignificant. A cheaper, more effective means of filling the soil with organic matter is by the use of liberal applications of inorganic fertilizers to stimulate larger growth of crops, parts or all of which are returned to the soil. No satisfactory scheme of soil-fertility maintenance has ever been developed in field practice that does not include the growing of certain types of soil-improving crops in the rotation, the primary purpose of which is to add to the supply of organic matter in the soil. A sod or cover crop, fertilized with inorganic materials and plowed under, puts back into the soil, in available form, all that crop got from the fertilizer, plus what it secured from the soil, air and water. Putting organic material through a fertilizer factory does not improve it for the special purposes for which it is believed to have value.

The study of trace elements and their effect on plants is one of the most interesting phases of work now being conducted by a very capable group of chemists, plant physiologists and agronomists of the several state experiment stations and the Federal Department of Agriculture. Certain specific symptoms of these deficiencies are now recognized as, for example, "rosette" of pecan trees; "crack stem" of celery; "mottling" of vegetables; and "sand drown" of tobacco. The cure for these and similar difficulties lies in the use of salts of zinc, boron, manganese, and magnesium, respectively. Certain raw peat soils require the use of a soluble salt of copper.

Plastic Industries Growth

By Williams Haynes

Publisher, "Chemical Industries"



FEW industries show a record of continuous expansion throughout the depression period; no industry, I believe, can equal the rate of growth of the plastic materials since 1929. In that year the total plastics output in the United States was somewhat less than 60 million pounds. The 1935 production exceeded 100 million pounds, probably close to 106 million. This figure is slightly larger than other estimates recently published; but a careful rechecking of the available information from first-hand sources indicates that the figures for phenolic resins, used in varnish and fabricated in plants which are also producers, have been understated.

The value of these 100 million pounds of plastics is about 50 million dollars, giving an average price of 50c per pound. This is, however, a very misleading figure. The range of prices is wide—from 10 to 12 cents for phenol formaldehyde molding powder to $1.50 for ethyl cellulose. Over half the production consists of the phenolics, the cheapest class of materials. The cast phenolics and cellulose acetate prices cluster about the average price of 50c a pound, while the urea resins (of which Beetle and Plaskon are the best known examples) are cheaper and Vinylite more expensive, though its price was lowered from 80 to 65 cents last year.

In considering the growth of the plastics industry we are certainly more interested in past developments as a promise of the future expansion, particularly of those plastics into whose manufacture agricultural products enter as raw materials.

These comprise three groups: 1. The plastics from cellulose. 2. The plastics from casein and soya beans. 3. The so-called Glyptal resins, made from glycerin, a by-product of the oils and fats industries.

In the cellulose group is the oldest synthetic plastic, the nitrocellulose type, familiar trade-names of which are Celluloid, Pyralin, and Fiberloid. The consumption of nitrocellulose plastics is fast diminishing. During the depression, the output has dropped 25 per cent. to about 15 million pounds. But within the cellulose group, and produced by the same manufacturers, is also to be found the single, most rapidly growing of all the newer plastics. This is cellulose acetate, produced not only in sheets, rods and tubes, but also recently as a powder for molding in presses. Introduced in 1932 the production of cellulose acetate plastics has grown to 12 million pounds. Yet this is not the only market for acetate raw materials; about 2½ million pounds of safety photographic film are made, nearly 56 million pounds of synthetic fibre (Celanese), and over 32,000,000 square feet of film filler for safety glass.

Acetate materials are more than taking up the losses of nitrocellulose. Cotton is the favored raw material, but from the chemurgic point of view, it is to be noted that the cotton nitrators have been shifting away from cotton to woodpulp as their source of cellulose because of the artificially high price at which the Government has held the South's great cash crop.

The casein plastics, although they have increased their consumption 25 per cent. during the depression, have never been among the more important, their total reaching now 4 million pounds. They are used mostly in buttons and custom jewelry for which the material can be easily fabricated even with wood-

working machinery. Of the soya bean plastics little can yet be definitely said as to prices or possibilities. Their characteristics are naturally similar to the casein materials and like them they are comparatively expensive. The Ford plant output is said to be now 300,000 pounds a year; 100,000 pounds of which represent soya bean material.

The rapid development of synthetic varnish resins has been outstanding the past three years. Among these synthetic resins, those produced from glycerine-phthalic anhydride are promising and interesting to us as a further profitable outlet for a by-product of the oils and fats used in the soap industry. This alkyd group is but one of the more important of a wide range of these new materials, some of which are also from such agricultural raw materials as linseed, tung, castor and other fatty oils.

Prophecy is at best hazardous. Nevertheless one may make two promises for the future growth of the plastics industry with reasonable assurance of their fulfillment.

Immediately, great expansion will come in synthetic resins for protective and decorative coatings, and within this sphere are obvious opportunities to develop new and greater uses of vegetable oils.

Eventually, the cost of plastics will be markedly lowered so that some day we shall have a synthetic material of this general type which shall cost not more than 4 or 5c a pound. Then, and then only, plastics will become competitive with wood and the cheaper metals as a construction material. If a plastic so cheap could be perfected which was a real extrusion material—that is, one that might be shoved out of some press by the mile as spaghetti and rayon are extruded—then we might truly herald the plastic age. Admittedly we are not even close to ideal today. But we gathered here today should be the last to admit that such an ideal is impossible.

Tung Oil

By C. C. Concannon

Chief, Chemical Division, U. S. Dept. Commerce

TUNG oil is an essential raw material for which the United States is almost entirely dependent upon a foreign source. The world supply of tung oil comes from China, and the United States is the biggest user. Our consumption in 1933 was 104,000,000 pounds, in 1934 it was 115,000,000 pounds and last year the total reached 127,000,000 in spite of the excessive price during the latter part of the year. From 1933 to the latter part of 1935 the price of tung oil (New York quotations) rose from 5 cents to 37 cents a pound. The United States consumes 75% of the supply shipped from China. For all practical purposes this amounts to 75% of the world's total available tung oils, disregarding the small amounts so far available from United States production.

We have no reason to expect unlimited supply of oil from China. It takes years to develop a tung grove, which must be considered by those entering American development of the industry. But those who embark upon tung oil production, once established, will find themselves with groves producing annually during the 50 or more years expected life of the tree.

Industrial consumption of tung oil in the United States has increased about 70% during the last four years, bringing the total for 1935 to about 127,600,000 pounds. Based on the average domestic price of 18 cents a pound, American manufacturers paid out $23,000,000 for tung oil in 1935. With the exception of relatively small quantities from Gulf Coast plantations, where an American tung industry is now being developed, all of our 1935 supply came from Hankow.

The paint and varnish industry uses more than 75% of the tung oil consumed in the United States. Consumption by this industry aggregated 98,440,000 pounds during the preceding year and 59,150,000 pounds in 1933. The linoleum industry, the second largest tung oil consumer, has increased its consumption from 7,300,000 pounds in 1932 to 10,391,000 pounds in 1935, and its use in printing ink has increased from 713,000 to 2,013,000 pounds over the same period. Use of tung oil in various other manufacturing processes has also increased rapidly. Considerable quantities are now being used in insulation materials for the electrical and wall board industries; in waterproofing compounds; automobile brake linings; for waterproofing paper and cloth bags, etc.

Science in Industry

By Charles M. A. Stine

Vice-President, E. I. du Pont de Nemours & Co.

WE look to science as the right arm of management to create new things and new jobs, to improve old products and to lower their costs, to make the labor of men easier and the comforts of life more abundant. Stop industrial research and we would at once elect ourselves the victims of the first foreign monopoly that chooses to exploit us. Only 10 years ago we paid $1.25 a pound for rubber. Thanks to industrial research, which developed a product superior to rubber out of coal, water, salt and limestone, America will never pay that price for rubber again. Dependence on Germany for dyes and medicines and potash, upon Chile for nitrate, upon Trinidad for asphalt and Japan for camphor, has become independence only because America's industrial scientists fought for it and won.

The idea that Nature's products are flawless is one of the most popular fallacies. It is almost the exception to find a raw material that is best for the use to which man puts it; as a rule Nature's material is merely the best to be had, or the cheapest. Frequently it contains impurities, and lack of uniformity is always troublesome.

The possibility of creating materials that would be pure, uniform in quality and better suited to our needs than those of Nature was clearly seen in the pre-war period. The ferrous and non-ferrous metals industries are two splendid examples of man's work in transforming Nature's materials to suit his needs. Somewhat different examples of new developments are the resin "Bakelite" and the textile rayon, which had already been synthesized by chemists. They had developed coated fabrics that in some respects were better than leather, they were imitating ivory, and had extracted nitrates from the air; but generally the scientific tool chest was still incomplete, technique was still sketchy, and many gaps were yet to be filled, to give to man-made materials the strategic position in industry which they occupy today.

Much has been accomplished since the World War. Plastics are in common use. Synthetic rubber, synthetic organic acids and alcohols, these are only a few of the very large number of developments of this character. A whole range of new coated fabrics have been developed; the paint industry has been revolutionized by new finishes; new refrigerants with

unique properties have made possible the expansion of mechanical refrigeration into the home and now air-conditioning bids fair to set new standards in building and transportation. Camphor made by man from turpentine is purer than that from the camphor tree; musk, one of the rarest of perfume bases, is being synthesized and sold at a fraction of what the natural product costs. Nitrates and ammonia from the air rule that market, and urea has become a factory product.

Science is indispensable for the development of agriculture. The coated textile industry, for rubber coated and pyroxylin coated textiles, uses approximately 110,000,000 yards a year of cotton cloth. It requires a pound of cotton to produce three yards of cloth of this grade, so that, roughly, this yardage requires 40,000,000 pounds of cotton, or 80,000 bales a year. These figures do not include the various types of textile fibers used by the oil cloth industry. The viscose rayon industry, for a production of 200,000,000 pounds of rayon in 1935, consumed about 73,300,000 pounds of linters. There was also used in this industry in 1935 approximately 86,000 tons of wood pulp. The acetate rayon industry, in the same period, consumed about 54,000,000 pounds of linters. The consumption of cotton linters of pyroxylin plastics in 1935 required 8,680,000 pounds of purified cotton. This would require all the linters cut from the seed on an acreage planted to cotton of approximately 600,000 acres. These merely touch the surface of cotton consumption.

We do not by any means know enough about the fundamental structure, composition and properties of cellulose from various sources, various types of vegetable oils, and carbohydrates such as sugars and starches. The one sure way to develop additional industrial outlets for vegetable and animal proteins is to institute thorough-going research work. Here is unlimited opportunity for more science in industry. Sustained effort will lead to new processes and products which may be of more vital importance to the farmer than the results obtained by those investigators working strictly within the agricultural field.

Soybean Oil in Paints

By E. E .Ware

Sherwin-Williams Company

SOYBEAN OIL is not only able to hold its own but can show outstanding performances in certain lines. In automobile baking and air-drying synthetics we get a depth of color, a freedom from "orange peel" and "silk," and a permanent elasticity not possible with other oils. The refrigerator finished with baked soybean synthetics has the true porcelain look. It also exhibits humidity and grease resistance and permanency of color not possible with linseed, perilla or tung. The roller coating and printing colors on a soybean basis have outstanding brilliance and color retention and performance when coated in the flat and subsequently fabricated. Their performance insures soybean oil a permanent place in the metal package industry. Recent advances in outdoor bulletin colors emphasize the use of soybean oil because of its free working, and in pictorial work it seems that soybean oil will always be used regardless of cost.

We must promote and cooperate in agricultural and processing research toward the improvement of the drying and film forming characteristics of soybean oil without sacrifice of its superior qualities of permanent elasticity and color retention. We must also assume the obligation of educating the retail consumer of paint products to a tolerance for the weakness of soy oil and to its advantages. To this end we should expect and even demand cooperation from national, state and municipal technical bureaus through whose efforts the original prejudice against oils other than linseed was created. Why not recognize the situation as entirely within our control and handle it by education rather than by legislation and sentimental boycott?

Starches and Sugars

By J. F. Walsh

Director of Research, American Maize Products Co.

ALL starches, irrespective of source, are essentially of the same chemical nature and subject to the same chemical reactions. The most common sources are corn, potatoes, wheat, rice, tapioca, and sago. Rice, tapioca, and sago are of little interest as domestic farm products, but seriously affect domestic starches through competition by importation.

Corn is our most important farm crop and, in 1927, 85.6 million bushels (a fourth of U. S. corn going to market) were ground by the corn processing industry, representing 2 billion 700 million pounds of starch; whereas, in 1935 only about 58.3 million bushels were ground, representing 1 billion 800 million pounds of starch. This was a loss of 27.3 million bushels of corn, or 900 million pounds of starch; a reduction of 32%.

This loss can partially be accounted for by the importations of tapioca and sago starch between 1927-1935, a loss of about 108,000 acres. This gain in importation is justified on a price basis. Corn starch can, as all other starches, be modified by chemical treatment, so that its modified form can be used in most fields. This to some extent could have been offset had incentive been afforded to the processing industry to modify its starch to match the characteristics of imported starches. Corn starch today finds its major outlets as food and in limited industrial uses. Its use, as of sugars, for food products, due to the curtailment in the consumption of carbohydrates generally, has declined. To offset this effect of competitive starches, there must be development of industrial fields and as a chemical raw material; the former through the development of chemical modification of its physical properties; the latter through taking advantage of the high purity and chemical nature of starch.

Starch has been used as a base for producing esters, principally starch nitrate and acetate, which are used in the manufacture of explosives and as a textile sizing and coating; oxidation products, such as the organic acids, tartaric, gluconic, and oxalic, used in the manufacture of food products and specialty chemical fields; and, by hydrolysis, converted to a series of modified starches, dextrins, syrups, and sugars, and by the action of selected enzymes producing a wide range of varying characteristics modified starches, extensively used in the food, textile, paper, laundry, automotive, fuel, and plastic industries for direct consumption, in compounds and as binders, filling agents, coatings and sizings, in addition to being found in some form or other in practically every home.

The principal hydrolysis product of corn starch is corn sugar, dextrose, one of the major domestically produced sugars and, like starch, available in a highly purified form, offering chemical industry another basic product which will find increasing uses as a starting material for new, important industrial compounds. It has been successfully used in the production of citric, lactic, oxalic, succinic, fumaric, malic, propionic, and kojic acids, ethyl alcohol, acetaldehyde, ethyl acetate, mannitol, and glycerol through fermentation processes, and chemically in oxidation, reduction, and polymerization reactions in the production of lactic acid, polyhydric alcohols, such as sorbitol and mannitol, and various type resins. Much can be done with it in both fermentation and chemical reactions.

With further knowledge of these two raw materials—corn starch and corn sugar (dextrose), the two most commonly occurring relatively pure chemical compounds, available in substantially unlimited quantities at an economically practical cost range, will lead to new and unknown products which will, in all probability, solve many farm problems which today we are attempting to legislate.

THE DOW CATALOG OF INDUSTRIAL CHEMICALS

ACETIC ANHYDRIDE—*Use:* Manufacture cellulose acetate, alkyl acetates, rayon, non-inflammable photographic films and certain synthetic dyestuff. Solvent and reagent in nitration of organic compounds.

ANILINE OIL—*Use:* Manufacture aniline colors, black and salt; indigo; azo dyestuffs; rubber chemicals, and pharmaceuticals such as acetanilid and salvarsan.

CALCIUM CHLORIDE, 77-80%—*Use:* Dehydrating oils and solvents, dehumidifying air and gases, providing very low freezing solutions of low vapor pressures, refrigerating brine, manufacture fireproof paints, sizing compounds, textile softeners, glues and paper; preservative in treatment of wood, leaves and foliage.

CARBON BISULPHIDE, 99.99% Pure—*Use:* Manufacture carbon tetrachloride, viscose rayon, captax, thiocarbanilide, diphenylguanidine, thiocyanates, and xanthates. Fabrication waterproof and seamless rubber goods, cold vulcanization, rubber reclamation. Manufacture rubber cements. Fumigant treatment grains and soils. Separation bitumens and sulphur. Recovery resins, oils and waxes.

CARBON TETRACHLORIDE, 99.9% Pure—*Use:* Degreasing textile fibres, cleaning and spotting textiles and clothing; degreasing and cleaning machinery, leather, paper stock, photographic films. Extracting fats, oils, waxes, alkaloids and resins. Ingredient paint and varnish removers and rubber cements.

CAUSTIC SODA, Solid—*Use:* Manufacture soap, soap lyes, boiler compounds, wood pulp for paper making and rayon. Bleaching, dyeing and printing textiles. Refining oils and fats. Reclaiming rubber. Cleaning and degreasing metals in numerous industries.

CHLOROFORM, Tech.—*Use:* Solvent rubber, photographic, dry cleaning industries. Solvent for alkaloids, fats, resins.

DOWTHERM A—*Use:* Industrial heat transfer work power plant boilers, chemical processes, oil distillation, laboratory heating, candy kitchens, linseed oil factories, and various process industries.

EPSOM SALT, Tech.—*Use:* Rayon, leather tanning, mordant assist dyeing and printing textiles, ingredient sizing materials paper industry and various purposes ceramic, explosive, match and fertilizer industries.

ETHYL BROMIDE—*Use:* Local anaesthetic, refrigerant, organic synthesis, and production drugs and dyes.

ETHYL CHLORIDE—*Use:* Refrigerant, local anaesthetic, insecticide, solvent, analytical reagent, manufacture dyes, pharmaceuticals, various organic derivatives.

ETHYLENE DICHLORIDE—*Use:* Dry cleaning and spotting, degreasing textiles, leather and metals. Extracting natural oils from vegetable matter, paint removers and various organic syntheses.

FERRIC CHLORIDE, Crystals, Commercial—*Use:* Mordant, oxidizing agent dye manufacture, coloring glass, photography, analytical chemistry, various organic syntheses, sewage and water treatment.

MAGNESIUM CHLORIDE, Flake—*Use:* High quality magnesia stucco and flooring cements. Floor sweeping compounds. Chill tempering tools used drilling for saline deposits.

MONOCHLORACETIC ACID, Tech.—*Use:* Manufacture dyes indigoid type, certain drugs, and photographic chemicals.

MONOCHLORBENZENE—*Use:* Manufacture phenol, aniline, sulphur dyestuffs, picric acid. Ingredient paint and varnish removers. General solvent.

ORTHODICHLORBENZENE, Tech.—*Use:* Solvent for waxes, ingredient paint removers, and removal grease and tars from automobiles. Ingredient sweeping compounds. Active insecticide fly and other liquid sprays, and manufacture preservative paints. Control termites.

PHENOL—*Use:* Manufacture synthetic resins, salicylic acid, picric acid, explosive phenolic compounds, synthetic tannins, photographic chemicals, various dye intermediates, special soaps, disinfecting and germicidal paints, drugs and pharmaceuticals. Selective solvent refining low-grade distillates.

PROPYLENE DICHLORIDE—*Use:* Solvent rubber industry. Paint and varnish remover. General solvent. Manufacture dry cleaning soaps.

SALICYLIC ACID, Tech.—*Use:* Preservative in such materials as glues and leather, manufacture organic derivatives such as methyl salicylate, dyestuffs and perfumes.

SODIUM ACETATE, Flake 62%—*Use:* Preservative for n in cold storage, adjusting pH syrup refining, separating op alkaloids.

SODIUM SULPHIDE, 60-—*Use:* Textile industry cl ing fabrics, dyeing, calico manufacture dyes and cer grades paper pulp. Also phiding metals. Depilat

SULPHUR CHLORI Yellow—*Use:* Vulcani and manufacture rubb goods. Manufacture gases, varnish, cellul esters, pharmaceutic and insecticides; pu sugar juices, textil dyeing and finishir extraction gold an hardening soft wo

TETRACHLOR ETHYLENE Tech.—*Use:* Ge General solven Ingredient det compositions, dry cleaning soaps, fire e extinguisher compounds and liquid high tensi switches.

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Agricultural Chemicals

Production nitrogen-phosphorus fertilizer material. No. 2,038,788. Edward W. Harvey, Highland Park, N. J., and Herman Albert Beekhuis, Jr., Syracuse, N. Y., to The Barrett Co., N. Y. City.

Separation of phosphorus from hot gaseous mixture by contacting with lime water. No. 2,039,297. Harry A. Curtis, Knoxville, Tenn., to TVA., Wilson Dam, Ala.

Process of agglomerating fine phosphate rock. No. 2,040,081. Harry A. Curtis, Knoxville, Tenn., to TVA, Wilson Dam, Ala.

Treatment of sodium nitrate-bearing material which contains sulfates of potassium and magnesium. No. 2,040,548. Edgar Stanley Freed, Norfolk, Va., to Compania Salitrera Anglo Chilena, a corp. of Chile.

Production of ammonium phosphates. No. 2,040,563. John J. Philips, Fairfield, Ala.

Production of various type phosphates in thin flaked form. No. 2,041,448. Robert E. Zinn, Chicago Heights, Ill., to Victor Chemical Works, Chicago.

Production of nitrates. No. 2,041,504. Charles F. Weston, Prince George County, Pa., to Atmospheric Nitrogen Corp., N. Y. City.

Cellulose

Clarification of cellulose ether solutions using caustic soda and a xanthating agent. No. 2,038,678. George A. Richter, Harold P. Vannah, and Royal H. Rasch to Brown Co., all of Berlin, N. H.

Production highly acetylated cellulose acetates. No. 2,039,290. Ernst Berl, Pittsburgh.

Process reducing the viscosity of cellulose nitrate. No. 2,039,381. Nicholas Bacon, Parlin, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production cellulose organic ester composition containing an alpha-substituted phenylethyl alcohol. No. 2,039,744. Henry B. Smith to Eastman Kodak Co., both of Rochester, N. Y.

Production non-alkali metal salts of cellulose dicarboxylic acid esters. No. 2,040,093. Carl J. Malm and Charles R. Fordyce to Eastman Kodak Co., all of Rochester, N. Y.

Production cellulose materials from waste cellulose products. No. 2,040,801. Wyly M. Billing, Hopewell, Va., to Hercules Powder Co., Wilmington, Del.

Production plasticized cellulose derivative compositions. No. 2,040,882. Norman D. Scott, Niagara Falls, N. Y., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Coal Tar Chemicals

Production diarylamines. No. 2,038,574. Frederick H. Kranz, Buffalo, N. Y., to National Anline & Chemical Co., N. Y. City.

Production ortho-nitro-anisole. No. 2,038,620. Henry J. Weiland and Otto Stallmann, South Milwaukee, Wis., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production methyl ester of tertiary butyl meta cresol. No. 2,038,947. August Julius Herman Maschmeijer, Amsterdam, and Enno Takens, Ouderkerk, near Amsterdam, Netherlands, to A. Maschmeijer, Jr., Inc., N. Y. City.

Production compounds of the acridinium series. No. 2,039,577. Louis Benda, Frankfort-am-Main, and Otto Sievers, Frankfort-am-Main-Hochst, Germany, to Winthrop Chemical Co., N. Y. City.

Production phenolic morpholines by condensing phenol with formaldehyde and morpholine. No. 2,040,039. Herman A. Bruson, Elkins Park, Pa., to Rohm & Haas Co., Philadelphia.

Production morpholino-metho polyhydric phenols. No. 2,040,040. Herman A. Bruson, Elkins Park, Pa., to Rohm & Haas Co., Philadelphia.

Method of recovering tar acids from vapor mixture. No. 2,040,084. Edward H. Ellms, Fairlawn, N. J., to The Barrett Co., N. Y. City.

Recovery of tar acids from tar. No. 2,040,096. Stuart Parmelee Miller, Englewood, N. J., to The Barrett Co., N. Y. City.

Method of distilling tar acid and neutral oil containing hydrocarbons. No. 2,040,097. Stuart Parmelee Miller, Scarsdale, N. Y., to The Barrett Co., N. Y. City.

Treatment of tar acid and neutral oil containing hydrocarbons. No. 2,040,098. Stuart Parmelee Miller, Scarsdale, N. Y., to The Barrett Co., N. Y. City.

Recovery of tar acids from hydrocarbon material. No. 2,040,099. Stuart Parmelee Miller, Englewood, N. J., to The Barrett Co., N. Y. City.

Process of tar treatment. No. 2,040,100. Stuart Parmelee Miller, Englewood, N. J., to The Barrett Co., N. Y. City.

Selective recovery of tar acids from tar. No. 2,040,101. Stuart Parmelee Miller, Englewood, N. J., to The Barrett Co., N. Y. City.

Method of distilling tar acids and neutral oil from hydrocarbons. No. 2,040,104. Arthur H. Radasch, Bloomfield, N. J., to The Barrett Co., N. Y. City.

Separation of isomeric dinitrobenzene from mixture with meta-dinitrobenzene. No. 2,040,123. Harold W. Coward, Kenmore, N. Y., to National Apiline & Chemical Co., N. Y. City.

Production arylamides of 5,6,7,8-tetrahydro-2-hydroxynaphthalene-3-carboxylic acid. No. 2,040,397. Heinrich Morschel, Cologne-Deutz, Germany, to General Aniline Works, Inc., N. Y. City.

Production 6-nitro-2,3-hydroxynaphthoic acid. No. 2,040,587. Arthur Zitscher, Cronberg in Taunus, Germany, to General Aniline Works, Inc., N. Y. City.

Production aminobutane-disulfonic acids and alkyl substitution products thereof. No. 2,040,626. Otto Nicodemus and Walter Schmidt, Frankfort-am-Main-Hochst, Germany, to General Aniline Works, Inc., N. Y. City.

Production acylamino derivatives of the anthrapyrimidine series. No. 2,040,857. Max Albert Kunz, Mannheim, and Karl Koeberle, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, Inc., N. Y. City.

Production of anthrapyrimidines. No. 2,040,858. Max Albert Kunz, Mannheim, and Karl Koeberle, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, Inc., N. Y. City.

Production compounds of the anthrapyrimidine series. No. 2,040,859. Max Albert Kunz, Mannheim, and Karl Koeberle, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, Inc., N. Y. City.

Production of anthrapyrimidines. No. 2,040,860. Max Albert Kunz, Mannheim, and Karl Koeberle, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, Inc., N. Y. City.

Production of anthrapyrimidines. No. 2,040,861. Max Albert Kunz, Mannheim, and Karl Koeberle, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, Inc., N. Y. City.

Production compounds of the anthrapyrimidine series. No. 2,040,862. Max Albert Kunz, Mannheim, and Karl Koeberle, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, Inc., N. Y. City.

Production of tetrahalogeno-ortho-aminophenols. No. 2,041,512. Max Raeck, Dessau-Haideburg in Anhalt, Germany, to General Aniline Works, Inc., N. Y. City.

Production of tetrahalogeno-ortho-aminophenols. No. 2,041,513. Max Raeck, Dessau-Haideburg in Anhalt, Germany, to General Aniline Works, Inc., N. Y. City.

Method of hydrolyzing chlor phenols. No. 2,041,592. Samuel G. Burroughs, Pittsburgh, Pa., to Penn Coal Products Co., a corp. of Pa.

Hydrolysis of chlor alkyl phenols. No. 2,041,593. Samuel G. Burroughs, Pittsburgh, Pa., to Penn Coal Products Co., a corp. of Pa.

Coatings

Process of coating ferrous articles with cadmium and zinc. No. 2,038,548. Elgin Carleton Domm to National-Standard Co., both of Niles, Mich.

Two-coat process for applying cadmium to ferrous articles. No. 2,038,549. Elgin Carleton Domm to National-Standard Co., both of Niles, Mich.

Method of electroplating cadmium on cadmium-zinc alloys. No. 2,038,550. Elgin Carleton Domm to National-Standard Co., both of Niles, Mich.

Method of electroplating zinc on cadmium-zinc alloys. No. 2,038,551. Elgin Carleton Domm to National-Standard Co., both of Niles, Mich.

Moisture proof coating composition containing paracoumarone-indene resin. No. 2,038,751. John D. Murray to The Murray Liquafilm Corp., both of Chicago.

Protective coating material comprising castor oil, a drying oil, and an unsaturated hydrocarbon soluble resin. No. 2,039,364. Charles A. Thomas and Carroll A. Hochwalt to Monsanto Petroleum Chemicals, Inc., all of Dayton, Ohio.

Protective coating material comprising a synthetic hydrocarbon resin. No. 2,039,365. Charles A. Thomas to Monsanto Petroleum Chemicals, Inc., both of Dayton, Ohio.

Coating composition comprising a hydrocarbon resin, a drying oil, castor oil—all dissolved in a petroleum solvent. No. 2,039,366. Charles A. Thomas to Dayton Synthetic Chemicals, Inc., both of Dayton, Ohio.

Production anti-fouling marine paint toxic to marine animal organisms, which contains zinc tellurite. No. 2,041,130. Loren C. Hurd, Madison, Wis., to Wisconsin Alumni Research Foundation.

Production bituminous dispersions for coatings or coverings. No. 2,041,234. Karl Daimler, Frankfort-am-Main-Hochst, Germany, to I. G., Frankfort-am-Main, Germany.

Production corrosion resistant coating containing zinc. No. 2,041,545. Carl E. Heussner to Chrysler Corp., both of Detroit.

Dyes, Stains, etc.

Production printing paste comprising Carbanthrene Black BB and an aliphatic assistant. No. 2,038,591. William R. Moorhouse to National Aniline & Chemical Co., both of N. Y. City.

Production chromiferous azodyestuffs. No. 2,038,859. Hugo Schweitzer. Leverkusen-Wiesdorf, Germany, to General Aniline Works, Inc., N. Y. City.

Production metallizable azodyestuffs. No. 2,038,942. Georges Kopp, Rouen, France, to Compagnie Nationale de Matieres Colorantes et Manufactures de Produits Chimiques du Nord Reunies, Etablissements Kuhlmann, Paris, France.

Production dyestuffs of the anthraquinone series. No. 2,039,023. Paul Nawiasky and Rudolf Robl, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, Inc., N. Y. City.

Production dyestuffs of the triarylmethane series. No. 2,039,571. Ottmar Wahl, Leverkusen-I. G. Werk, Ernst Teupel, Leverkusen-Weisdorf, and Karl Schmidt, Cologne-Mulheim, Germany, to General Aniline Works, Inc., N. Y. City.

Coloring of cellulose ester and cellulose dope solutions. No. 2,039,708. Harold W. Crouch and Earold C. Jewett to Eastman Kodak Co., all of Rochester, N. Y.

Production pyridino vat dyestuffs. No. 2,039,809. Max Albert Kunz, Mannheim, and Karl Koeberle and Gerd Kochendoerfer, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, Inc., N. Y. City.

Production azo dyestuffs for dyeing leather. No. 2,039,898. Joseph Gyr to Society of Chemical Industry in Basle, both of Basel, Switzerland.

Patents digested include issues of the "Patent Gazette," Apr. 28 through May 19 inclusive.

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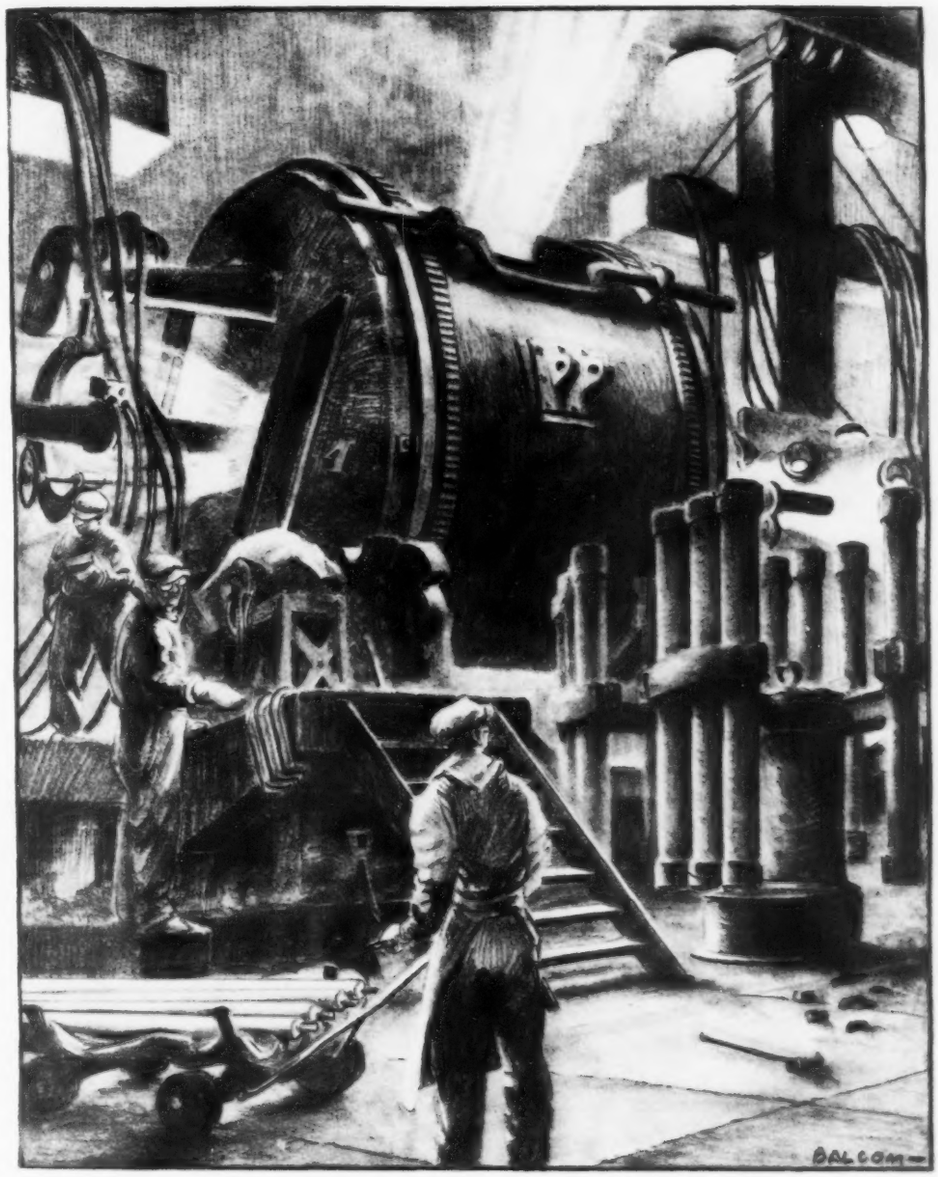

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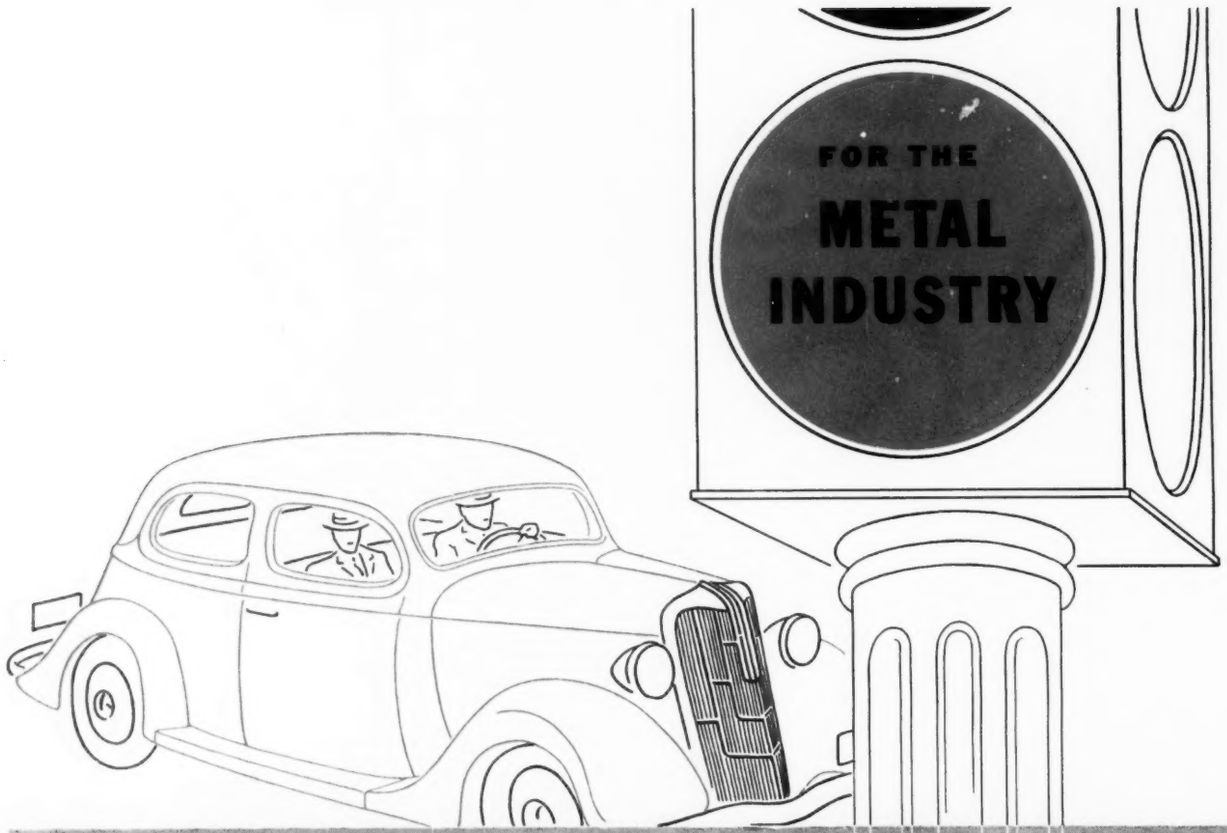

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Production chromium-containing azo dyestuffs. No. 2,040,368. Erich Fischer, Bad Soden-am-Taunus, Germany, to General Aniline Works, Inc., N. Y. City.

Production brominated vatdyestuffs of the benzanthronylaminoanthraquinone series. No. 2,040,380. Ernst Honold and Rudolf Muller, Frankfort-am-Main-Fechenheim, Germany, to General Aniline Works, Inc., N. Y. City.

Production azo dyestuffs. No. 2,040,473. Robert E. Etzelmiller to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Process of dyeing animal fibres with metal complexes of organic acid dyestuffs. No. 2,040,796. Carl Maria Rittinghausen, Bad Soden-am-Taunus, and Richard Haynn, Frankfort-am-Main, Germany, to General Aniline Works, Inc., N. Y. City.

Method of coloring textile materials using an azo coupling component. No. 2,040,927. George Holland Ellis and Ernest William Kirk, Spondon, near Derby, England, to Celanese Corp. of Am., a corp. of Del.

Production stable dyeing and printing preparations comprising leuco sulfuric acid esters of benzanthrone vat dyestuffs. No. 2,041,220. Ludwig Zeh, Leverkusen-Wiesdorf, and Erich Konrad, Leverkusen-I. G. Werk, Germany, to Durand & Huguenin Aktiengesellschaft, Basel, Switzerland.

Production enolic sulfuric esters of hydroindanthrones. No. 2,041,402. David Alexander Whyte Fairweather, Laurieston, and Robert Fraser Thomson, Grangemouth, Scotland, to Scottish Dyes Ltd., a co. of Great Britain.

Production azo-dyestuffs. No. 2,041,455. Gerald Bonhote, Basel, and Carl Apotheker, Riehen, Switzerland, to Society of Chemical Industry in Basle, Basel, Switzerland.

Production vat dyestuffs of the anthraquinone series. No. 2,041,550. Hans Krzilkalla and Walter Limbacher, Ludwigshafen-am-Rhine, Germany, to General Aniline Works, Inc., N. Y. City.

Explosives

Production propellant powder containing small amounts tin dioxide and potassium sulfate. No. 2,038,700. Richard George Woodbridge to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Blasting charge. No. 2,038,772. James Taylor, Saltcoats, Scotland, to Imperial Chemical Industries Ltd., a corp. of Great Britain.

Fine Chemicals

Production halo-butadienes by reaction and fractional distillation. No. 2,038,538. Wallace H. Carothers, Fairville, Pa., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Synthetic production of urea from ammonia and carbon dioxide. No. 2,038,564. Harry C. Hetherington to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production butadienes and their chlorinated derivatives. No. 2,038,593. Irving Elkin Muskat, Chicago, to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production compounds containing a mercaptide group. No. 2,038,609. Erwin Schwenk, Berlin-Westend, and Max Gehrke, Berlin-Halensee, Germany, to Schering-Kahlbaum A. G., Berlin, Germany.

Production acidylated aromatic amines. No. 2,039,304. Henry Dreyfus, London, England.

Production acidyl derivatives of diamino diphenyl bases. No. 2,039,305. Henry Dreyfus, London, England.

Production tertiary alkyl phenols. No. 2,039,344. Mark E. Putnam, Edgar C. Britton, and Ralph P. Perkins to The Dow Chemical Co., all of Midland, Mich.

Production monoalkyl-naphthylamines. No. 2,039,390. Paul W. Carleton, Pennsgrove, and Edwin L. Mattison, Carneys Point, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Process for partial dealkylation of dialkyl aromatic amines. No. 2,039,391. Paul W. Carleton, Pennsgrove, and Edwin L. Mattison, Carneys Point, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production almost tasteless compounds of quinine. No. 2,039,415. Max Hoffer, Basel, Switzerland, to Hoffmann-La Roche, Inc., Nutley, N. J.

Production alkaline earth salts of 2, 4, 5-trichlorophenol. No. 2,039,434. Lindley E. Mills to The Dow Chemical Co., both of Midland, Mich.

Production ether hydrochlorides of pseudourea. No. 2,039,514. Martin Battegay, Mulhouse, France, to Calco Chemical Co., Bound Brook, N. J.

Formation of tetrathionate solutions by electrolytic oxidation of thiosulfate solution. No. 2,039,555. Ludwig Rosenstein, San Francisco.

Production polymerized aromatic hydrocarbon compositions containing luminous substances. No. 2,039,734. Georg Meder, Munster (Taunus), and Konrad Schad, Frankfort-am-Main-Hochst, Germany, to I. G., Frankfort-am-Main, Germany.

Production of a diethyl acetyl quinine ester. No. 2,039,802. Hans Kaufmann, Munster, Germany.

Production 2-keto-levo-gulonic acid and its products. No. 2,039,929. Tadeus Reichstein, Zurich, Switzerland, to Hoffman-La Roche, Inc., Nutley, N. J.

Production salts of organic arsonic acids with acridine compounds. No. 2,040,070. Max Bockmul, Frankfort-am-Main, and Alfred Fehrle, Bad Soden-am-Taunus, Germany, to Winthrop Chemical Co., N. Y. City.

Separation and recovery of krypton and xenon from gaseous mixtures. No. 2,040,107. Joseph L. Schlitt, Darien, Conn., to Air Reduction Co., N. Y. City.

Separation and recovery of krypton and xenon from air. No. 2,040,108. Joseph L. Schlitt, Darien, Conn., to Air Reduction Co., N. Y. City.

Separation and recovery of krypton and xenon from air. No. 2,040,112. Claude C. Van Nuys, Cranford, N. J., to Air Reduction Co., N. Y. City.

Separation and recovery of krypton and xenon from gaseous mixtures. No. 2,040,116. Walter Wilkinson, Rye, N. Y., and Joseph L. Schlitt, Darien, Conn., to Air Reduction Co., N. Y. City.

Production 3-methylal-n-pentane. No. 2,040,130. Paul Halbig and Felix Kaufler to Dr. Alexander Wacker Gesellschaft fur Elektrochemische Industrie G.m.b.H., both of Munich, Germany.

Production of beta-methylcholine derivatives and salts. No. 2,040,145. Randolph T. Major, Mountainside, and Joseph K. Cline, Woodbridge, N. J., to Merck & Co., Rahway, N. J.

Production beta-methylcholine derivatives and salts. No. 2,040,146. Randolph T. Major, Plainfield, and Joseph K. Cline, Woodbridge, N. J., to Merck & Co., Rahway, N. J.

Production formaldehyde derivatives of 1-mercaptothiazoles. No. 2,040,467. Albert M. Clifford, Stow, Ohio, to Wingfoot Corp., Wilmington, Del.

Production protein compound of sulfonated hydrocarbon sulfur bodies. No. 2,040,809. Eric T. Hessle, Chicago.

Production acetyl salicylic acid solution. No. 2,040,848. Louis Hirschhorn, N. Y. City.

Production monocarboxylic acid esters by carboxylic reduction of a natural acidic resin. No. 2,040,849. Harold S. Holt to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production substantially undegraded deacetylated chitin. No. 2,040,879. George W. Rigby to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production alkoxy-alkyl-amino-benzothiazoles. No. 2,040,928. Max Englemann to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production esters of boric acid. No. 2,040,997. Frank Willard Johnson, Pennsgrove, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production acylated polypeptides. No. 2,041,265. Ludwig Orthner, Leverkusen-I. G. Werk, and Georg Meyer, Cologne-Mulheim, Germany, to I. G., Frankfort-am-Main, Germany.

Production aqueous solution of basic heterocyclic nitrogen compounds. No. 2,041,436. Werner Schulemann and Fritz Schonhofer, Wuppertal-Elberfeld, Germany, to Winthrop Chemical Co., N. Y. City.

Production of theobromine from cocoa waste. No. 2,041,561. Ernest Alfred Mauersberger, Maarssen, near Utrecht, Netherlands.

Glass and Ceramics

Use of tin chloride on glass plates before process of laminating. No. 2,038,565. August W. Hornig, Chicago.

High electrical resistant soft glass composition containing oxides of silicon, sodium, potassium, lead, barium and boron. No. 2,038,690. William C. Taylor to Corning Glass Works, both of Corning, N. Y.

Production glass resistant to alkali metal vapors by applying a fused-in coating of alkali fluoride and boric oxide. No. 2,038,691. William C. Taylor to Corning Glass Works, both of Corning, N. Y.

Production barium optical glass containing some tin oxide. No. 2,038,726. Frederick Gelstharp, Tarentum, Pa., to Pittsburgh Plate Glass Co., a corp. of Pa.

Method of decorating enamel ware. No. 2,039,548. Walter B. Moore to The Moore Enameling & Mfg. Co., both of West Lafayette, Ohio.

Production ceramic refractory for spark-plugs comprising refractory oxide and calcined zeolite. No. 2,040,051. Emil Klinger, Zuffenhausen, Germany, to Robert Bosch Aktiengesellschaft, Stuttgart, Germany.

Production laminated glass. No. 2,040,238. Frederic L. Bishop, Fox Chapel Manor, Pa.

Production of safety glass which contains an ester of silicic acid in the adhesive layer. No. 2,041,528. Emile Clement Cottet, Lyon, France, to Societe des Usines Chimiques Rhone-Poulenc, Paris, France.

Industrial Chemicals, etc.

Production oxygen-ammonia gas mixtures. No. 2,038,562. Edward W. Harvey, Highland Park, N. J., to The Barrett Co., N. Y. City.

Catalytic production of hydrogen. No. 2,038,566. Rudolf Huettner, Oppau, and Gustav Wietzel, Mannheim, Germany, to I. G., Frankfort-am-Main, Germany.

Production alkali metal nitrates from the chlorides. No. 2,038,569. Oscar Kaselitz, Berlin, Germany.

Electrolytic cell comprising copper and zirconium as electrodes and a solution of glycerin and primary potassium phosphate. No. 2,038,616. Willem Christiaan van Geel and Jan Hendrik de Boer, Eindhoven, Netherlands, to Radio Corp. of Am., a corp. of Del.

Process of refining fatty acids by contacting with concentrated phosphoric acid. No. 2,038,617. Hans G. Vesterdal, Elizabeth, N. J., to Standard Oil Development Co., a corp. of Del.

Production ethers of polyhydric alcohols. No. 2,038,705. Alfred William Baldwin, Blackley, Manchester, and Isidor Morris Heilbron and William Edward Jones, Victoria University, Manchester, England, to Imperial Chemical Industries Ltd., a corp. of Great Britain.

Production anti-freeze compound comprising an aqueous solution containing a nitrous acid salt. No. 2,038,724. Arthur Eichengrun, Charlottenburg, Germany, to Celanese Corp. of Am., a corp. of Del.

Method of mining sulfur. No. 2,038,757. Lawrence O'Donnell, Houston, Tex.

Separation of formic and acetic acids by use of thiophene. No. 2,038,865. Theodore O. Wentworth and Stanley Nelson Baechle to The Vulcan Copper & Supply Co., all of Cincinnati.

Anti-corrosion composition comprising soluble metal nitrite and an inert film-forming oil. No. 2,038,988. Lloyd M. Burghart, Glenbrook, Conn., to U. S. Industrial Alcohol Co., N. Y. City.

Nitration of sugars and their glycosides. No. 2,039,045. Joseph A. Wyler, Allentown, Pa., to Trojan Powder Co., a corp. of N. Y.

Nitration of sugars. No. 2,039,046. Joseph A. Wyler, Allentown, Pa., to Trojan Powder Co., a corp. of N. Y.

Method preparing a solution of sulfide in sulfur. No. 2,039,070. Werner W. Duecker, Pittsburgh, Pa., to Texas Gulf Sulphur Co., a corp. of Tex.

Absorption of gaseous ether by contacting with concentrated zinc halide solution. No. 2,039,170. Hans Klein, Mannheim, Germany, to I. G., Frankfort-am-Main, Germany.

Process carrying out catalytic reactions. No. 2,039,259. Mathias Pier, Heidelberg, and Paul Jacob and Walter Simon, Ludwigshafen-am-Rhine, Germany, to Standard-I. G. Co., Linden, N. J.

Production nitrous oxide by decomposition of ammonium nitrate. No. 19,953—reissue. Walter Friederich, Troisdorf, Germany.

Purification of carbon dioxide using activated carbon, paraffin or heavy oil. No. 2,039,330. Ralph H. McKee, Jersey City, N. J.

Production barium and calcium sulfates from crude salt. No. 2,039,432. Jean McCallum, Ferguson, Mo., to Titanium Pigment Co., Inc., N. Y. City.

Concentration of lyes obtained in cellulose industries. No. 2,039,444. Erik Oman, Stocksund, and Hans Elis Abraham Goth, Stockholm, Sweden, to Industrikemiska Aktiebolaget, Stockholm, Sweden.

Production dehydrating composition comprising calcium chloride, paradichlorobenzene, and sodium chloride, all distributed in wax. No. 2,039,512. Howard H. Baker, Buffalo.

Production of acetone by dehydrogenation of isopropyl alcohol. No. 2,039,543. Hermanus Frans Joseph Lorang, Amsterdam, Netherlands, to Shell Development Co., San Francisco.

Production of starch from wet starch-bearing feed material. No. 2,039,605. Albert Peltzer, Jr., Palo Alto, Cal., to Merco Centrifugal Separator Co. Ltd., San Francisco.

Production of sulfur and a metal oxide from sulfur bearing ores. No. 2,039,645. Ingenuin Hechenbleikner to Chemical Construction Corp., both of Charlotte, N. C.

Production magnesium oxide and magnesium chloride from calcium and magnesium mixtures. No. 2,039,653. Robert Burns MacMullin, Niagara Falls, N. Y., to The Mathieson Alkali Works, N. Y. City.

Production organic acids by contacting a saturated aliphatic alcohol with a compound hydrolyzing to alcohol and carbon monoxide on treatment with carbon tetrachloride. No. 2,039,722. Alfred T. Larson to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production insulating and dielectric material which contains a ketone. No. 2,039,837. Anderson W. Ralston and Carl W. Christensen to Armour & Co., all of Chicago.

Production quaternary ammonium compounds by peralkylation of a polyethylenepolyamine. No. 2,040,061. Ferdinand Munz, Frankfort-am-Main, and Karl Keller, Frankfort-am-Main-Fechenheim, Germany, to General Aniline Works, Inc., N. Y. City.

Production stable bituminous emulsions using an alkali metal caseinate. No. 2,040,115. Vilas E. Watts to American Bitumuls Co., both of San Francisco.

Separation of solids by froth flotation. No. 2,040,187. Ernest H. Rose, Los Angeles, and William T. MacDonald, La Jolla, Cal.

Preparation of contact catalysts. No. 2,040,233. Homer Adkins, Madison, Wis.

Production bonded silicon carbide refractories. No. 2,040,236. Raymond C. Benner and George J. Easter to The Carborundum Co., all of Niagara Falls, N. Y.

Purification and extraction of sulfur bearing material. No. 2,040,359. Robert Henry Clayton, Herbert Ernest Williams, and Hugh Burton Avery to The Manchester Oxide Co., Ltd., all of Manchester, England.

Production drying oil composition. No. 2,040,461. Robert D. Bonney, Glen Ridge, and Walter S. Egge, West Orange, N. J., to Congoleum-Nairn Inc., a corp. of N. Y.

Production of lithium salts. No. 2,040,573. Hans Siegens, Goslar, and Oskar Roder, Langelsheim, Germany, to American Lurgi Corp., N. Y. City.

Recovery of sulfur from finely divided metallic sulfide ore. No. 2,040,682. Raymond F. Bacon, Bronxville, N. Y., and Wilbur Judson, Newgulf, Tex.

Purification of concentrated caustic solutions. No. 2,040,717. Earl Sweetland, Grosse Isle, and Raymon E. Vander Cook, Inkster, Mich., to Penn Salt Mfg. Co., Philadelphia.

Production aryl-mercuric nitrates. No. 2,040,765. Edgar C. Britton, Ralph P. Perkins, and Joseph T. Lundquist to The Dow Chemical Co., all of Midland, Mich.

Production agglomerated carbon black. No. 2,040,770. Hans Walter Grote, Charleston, W. Va., to United Carbon Co., Baltimore, Md.

Recovery of caustic hydroxide from waste solutions. No. 2,040,805. Hilton Wayne Casey, Boothwyn, Pa.; one-half to Jay Cooke Alexander, Media, Pa.

Production coated diatomaceous earth product. No. 2,040,818. Marion S. Badollet, Fanwood, N. J., to Johns-Manville Corp., N. Y. City.

Production titanium compounds by converting an ore-carbon mixture. No. 2,040,854. Charles J. Kinzie and Donald S. Hake, Niagara Falls, N. Y., to The Titanium Alloy Mfg. Co., N. Y. City.

Series of patents dealing with solvent and refrigerant compounds to be used for absorption refrigeration. Nos. 2,040,894-2,040,912 inclusive. Glenn F. Zellhoefer, Bloomington, Ill.

Production of tolyl carbinol. No. 2,040,913. William J. Amend to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Concentration of aqueous solutions of aliphatic acids. No. 2,040,926. Henry Dreyfus, London, England.

Production activated carbon from lignite by washing with hydrochloric acid and carbonizing with an activating gas. No. 2,040,931. Walter Fuchs, Ostrava, Czechoslovakia.

Production polyhydroxy alcohols by converting a non-aromatic polybasic acid. No. 2,040,944. Wilbur A. Lazier, Marshallton, Del., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Production magnesium products from concentrated brines. No. 2,041,047. Heinz H. Chesny, San Francisco, William H. Farnsworth, San Mateo, and Paul D. V. Manning, Berkeley Woods, Cal., to Marine Chemicals Co., Ltd., San Francisco.

Production furoic acid by oxidizing furfural in presence of a silver activator. No. 2,041,184. Lloyd L. Isenhour to The Quaker Oats Co., both of Chicago.

Esterification of olefines. No. 2,041,193. William McCandliss Lee to The Sharples Solvents Corp., both of Philadelphia.

Method of inducing crystallization. No. 2,041,197. Albert Adams Lund, Port Washington, N. Y., to California Fruit Growers Exchange, Los Angeles.

Production condensation product from an aliphatic acid, a polyhydric alcohol, and a non-drying oil. No. 2,041,248. Almon G. Hovey to Helmuth Reichhold (Reichhold Chemicals), both of Detroit.

Production of glycols by saponifying an alkyl dihalide in presence of a water-insoluble metal carbonate. No. 2,041,272. Rene de M. Taveau, Newburgh, N. Y., to The Texas Co., N. Y. City.

Method of treating magnesium articles using solution of hydrogen chloride, a soluble chromate, and a soluble magnesium salt. No. 2,041,331. John A. Gann and William H. Gross to The Dow Chemical Co., all of Midland, Mich.

Treatment of sulfur-bearing mine bleed waters. No. 2,041,397. Carl E. Butterworth, New Gulf, and James W. Schwab, Gulf, Tex., to The Koppers Co. of Del., a corp. of Del.

Dehydration of acetic acid and other lower fatty acids. No. 2,041,668. Theodore O. Wentworth to The Vulcan Copper & Supply Co., both of Cincinnati, Ohio.

Metals, Alloys, Ores

Production ferrous alloy casting containing chromium, silicon, carbon, manganese, sulfur, phosphorus, and iron. No. 2,038,639. Charles O. Burgess, N. Y. City, to Union Carbide & Carbon Corp., a corp. of N. Y.

Recovery of pure metal values from solution. No. 2,038,850. John Augustus Murphy, Jr., Tulsa, Okla.

Separation of zinc and cadmium in sulfate solution. No. 2,038,969. Roscoe Teats, Denver, Colo., to American Smelting & Refining Co., N. Y. City.,

Copper-antimony or copper-bismuth coated ferrous metals. No. 2,039,067. Elgin Carleton Domm to National-Standard Co., both of Niles, Mich.

Method of attaching a cadmium, zinc, tin, or lead coated ferrous article to a rubber body. No. 2,039,068. Elgin Carleton Domm to National-Standard Co., both of Niles, Mich.

Method of refining various metals. No. 2,039,087. Augustus B. Kinzel, Douglaston, N. Y., to Union Carbide & Carbon Corp., a corp. of N. Y.

Treatment of aluminum or aluminum alloys. No. 2,039,165. Kazuma Hayakawa, Hodogaya-ku, Yokohama, Japan.

Process of electrodepositing gold on a chromium alloy steel base for pen-point use. No. 2,039,326. Hiram Stanhope Lukens, Philadelphia, to C. Howard Hunt Pen Co., Camden, N. J.

Pen point comprising base of chromium alloy covered with oxide film and electrodeposited gold plate. No. 2,039,327. Hiram Stanhope Lukens, Philadelphia, to C. Howard Hunt Pen Co., Camden, N. J.

Method of gold plating chromium alloy steel. No. 2,039,328. Hiram Stanhope Lukens, Philadelphia, to C. Howard Hunt Pen Co., Camden, N. J.

Recovery of zinc from zinc oxide ores. No. 2,039,331. Thomas A. Mitchell to Hughes-Mitchell Processes, Inc., both of Denver, Colo.

Production aluminum alloy containing also copper, magnesium, silicon, and manganese. No. 2,039,458. Josef Schulte to Vereinigte Leichtmetallwerke G.m.b.H., both of Bonn-am-Rhine, Germany.

Production metallic magnesium by reacting magnesium oxide and a reducing agent. No. 2,039,483. Fritz Hansgirg, Radenthein, Austria, to American Magnesium Metals Corp., Pittsburgh, Pa.

Precipitation treatment of gold bearing cyanide solutions. No. 2,039,656. Louis D. Mills and Thomas B. Crowe, Palo Alto, Cal., to The Merrill Co., San Francisco.

Production hard welding composition consisting of tantalum carbide and tungsten metal. No. 2,039,822. Philip M. McKenna, Unity Township, Westmoreland County, Pa., to Vanadium-Alloy Steel Co., Latrobe, Pa.

Method and apparatus for roasting and heat treating ores and minerals. No. 2,039,833. Clarence Q. Payne, Shippan Point, Stamford, Conn.

Production of alloy containing lead, tin, silicon and copper. No. 2,040,053. Arthur R. Lytle, Flushing, N. Y., to Union Carbide & Carbon Corp., a corp. of N. Y.

Production lead bronze composition containing lead, tin, zinc, silicon and copper. No. 2,040,054. Arthur R. Lytle, Niagara Falls, N. Y., to Union Carbide & Carbon Corp., a corp. of N. Y.

Production copper base alloy containing lead, tin, zinc, silicon and copper. No. 2,040,055. Arthur R. Lytle, Niagara Falls, N. Y., to Union Carbide & Carbon Corp., a corp. of N. Y.

Lead alloy containing small amount of strontium. No. 2,040,078. Robert H. Canfield and Herman F. Kaiser, Washington, D. C.

Slag and agitation heat treatment of metals. No. 2,040,167. Edwin L. Crosby to De..oit Electric Furnace Co., both of Detroit.

Welding rod alloy steel containing carbon, manganese, silicon and vanadium. No. 2,040,189. Jerome Strauss, Pittsburgh, to Vanadium Corp. of Am., Bridgeville, Pa.

Process for maintaining a molten bath of cadmium or cadmium alloy. No. 2,040,269. Albert J. Phillips, Metuchen, and Carl E. Schwartz, Highland Park, N. J., to American Smelting & Refining Co., N. Y. City.

Process of coating ferrous metals with cadmium, using small amount of nickel in the bath. No. 2,040,282. Carl E. Swartz, Highland Park, N. J., to American Smelting & Refining Co., N. Y. City.

Flux for cadmium and its alloys comprising cadmium and alkali metal chlorides and bromides. No. 2,040,283. Carl E. Swartz, Highland Park, N. J., to American Smelting & Refining Co., N. Y. City.

Vacuum method of manufacturing steel. No. 2,040,566. Wilhelm Rohn to Heraeus-Vacuumschmelze A. G., both of Hanau-am-Main, Germany.

Production sintered hard metal alloy containing tungsten carbide, a metal of the iron group, and boron. No. 2,040,592. Karl Becker, Berlin-Lichterfelde-Ost, Germany, to Wolfram & Molybdaen A.-G., Zurich, Switzerland.

Manufacture of low carbon iron and steel alloys. No. 2,040,604. Herbert Gruber and Wilhelm Rohn to Hereaus Vacuumschmelze A. G., both of Hanau-am-Main, Germany.

Electrolytic method of brightening aluminum surfaces using chromic acid and hydrofluoric acid. No. 2,040,617. Ralph B. Mason, New Kensington, and Martin Tosterud, Arnold, Pa., to Aluminum Co. of Am., Pittsburgh.

Electrolytic brightening of aluminum surfaces using a solution containing sulfuric and hydrofluoric acids. No. 2,040,618. Ralph B. Mason, New Kensington, and Martin Tosterud, Arnold, Pa., to Aluminum Co. of Am., a corp. of Pa.

Production alloys containing copper and phosphorus. No. 2,040,797. Georg Sachs and Arthur Burkhardt, Frankfort-am-Main, Germany, to American Lurgi Corp., N. Y. City.

Production metallic beryllium by treating the hydroxide with an alkali salt of a weak acid. No. 2,040,804. John E. Bucher, Fort Lee, N. J., to Antioch Industrial Research Institute, Inc., Yellow Springs, Ohio.

Smelting process for treating mixed oxides of lead, tin, and zinc. No. 2,040,825. Jesse O. Betterton and Albert J. Phillips, Metuchen, N. J., to American Smelting & Refining Co., N. Y. City.

Treatment of brass and bronze secondary materials. No. 2,040,826. Jesse O. Betterton and Albert J. Phillips, Metuchen, N. J., to American Smelting & Refining Co., N. Y. City.

Electrolytic deposition of chromium. No. 2,040,881. Floricel A. Rojas to Rojas Chemical Works, Inc., both of N. Y. City.

Production aluminum casting alloy which contains also small amounts of manganese and titanium. No. 2,041,042. John Bartow Bates to Titanite Alloys Corp., both of Euclid, Ohio.

Electrolytic production of metallic beryllium. No. 2,041,131. Gustav Jaeger, Neu-Isenburg in Hesse, Germany.

Pen-point alloy containing silver solder of silver, copper and zinc. No. 2,041,381. Johann Simon Streicher to American Platinum Works, both of Newark, N. J.

Pulverulent alloy comprising a mixture of at least two metal carbonyls. No. 2,041,493. Leo Schlecht and Albert Heinzel, Ludwigshafen-am-Rhine, Germany, to I. G., Frankfort-am-Main, Germany.

Production heavy wear steel containing phosphorus, silicon, manganese, chromium, copper and iron. No. 2,041,635. Herbert Buchholtz, Dortmund, Germany, to Vereinigte Stahlwerke Aktiengesellschaft, Dusseldorf, Germany.

Naval Stores

Refining of natural oleoresin. No. 2,039,481. Ralph W. Frey, Mount Rainier, Md., and Wiley C. Smith, Clarendon, Va., to Henry A. Wallace, Sec. of Agriculture of the U. S.

Paper and Pulp

Production paper sheet comprising fibres of alkali-solubilizable hydroxycellulose ether. No. 2,038,679. George A. Richter to Brown Co., both of Berlin, N. H.

Production of paper with grease-proof surface. No. 2,039,361. Joseph Henry Swan, 3rd, to The Gardner-Richardson Co., both of Middletown, Ohio.

Production of paper containing an alkaline filler. No. 2,040,878. Harold Robert Rafton, Andover, Mass., to Raffold Process Corp., a corp. of Mass.

Process for sizing paper. No. 2,041,285. Judson A. DeCew, Mount Vernon, N. Y.

Production of paper containing a filler which is normally reactive to acidic material. No. 2,041,294. Frank J. Lang, Niagara Falls, N. Y., to International Paper Co., N. Y. City.

Production parchment paper having high alpha-cellulose content. No. 2,041,485. Fred O. Reiss, Alexandria, Ind., to The Mantle Lamp Co. of Am., Chicago.

Cyclic process for treating alkaline pulps. No. 2,041,666. George A. Richter to Brown Co., both of Berlin, N. H.

Petroleum Chemicals

Production emulsifiable bituminous substances. No. 2,038,572. Hans Klein, Mannheim, Germany, to I. G., Frankfort-am-Main, Germany.

Destructive distillation of carbonaceous material using a metal sulfide as catalyst. No. 2,038,599. Mathias Pier, Heidelberg, and Paul Jacob and Walter Simon, Ludwigshafen-am-Rhine, Germany, to Standard-I. G. Co., Linden, N. J.

Production cracked motor fuel containing catechol as gum-preventative. No. 2,038,630. Harry T. Bennett and Le Roy G. Story, Tulsa, Okla., to Gasoline Antioxidant Co., Wilmington, Del.

Production cracked motor fuel containing small amount of orthophenylenediamine to prevent gum formation. No. 2,038,631. Harry T. Bennett, Tulsa, Okla., and Le Roy G. Story, Mount Vernon, N. Y., to Gasoline Antioxidant Co., Wilmington, Del.

Preventing gum formation in cracked motor fuel using an aromatic amine. No. 2,038,632. Harry T. Bennett, Tulsa, Okla., and LeRoy G. Story, Beacon, N. Y., to Gasoline Antioxidant Co., Wilmington, Del.

Process dewaxing lubricating stocks using phenol. No. 2,038,640. Robert E. Burk to The Standard Oil Co., both of Cleveland.

Recovery of alkyl lead compounds from the reaction mass. No. 2,038,703. Louis S. Bake, Pennsgrove, and Alfred E. Parmelee, Carneys Point, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Recovery of tetra alkyl lead from reaction mass. No. 2,038,704. Louis S. Bake, Pennsgrove, and Alfred E. Parmelee, Carneys Point, N. J., to E. I. du Pont de Nemours & Co., Wilmington, Del.

Process for increasing productiveness of wells. No. 2,038,720. Melvin De Groote, St. Louis, Mo., to Tretolite Co., Webster Groves, Mo.

Solvent refining of hydrocarbon oil. No. 2,038,798. Robert E. Manley, Beacon, N. Y., to The Texas Co, N. Y. City.

Production poly-keto fatty acid body. No. 2,039,063. Melvin De Groote, St. Louis, and Bernhard Keiser and Arthur F. Wirtel, Webster Groves, Mo., to Tretolite Co., Webster Groves, Mo.

Production polyketo fatty acid body. No. 2,039,064. Melvin De Groote, St. Louis, Bernhard Keiser, Webster Groves, and Arthur F. Wirtel, Richmond Heights, Mo., to Tretolite Co., Webster Groves, Mo.

Purification of naphthenic acids. No. 2,039,106. Roy F. Nelson, Nederland, Tex., and Louis Zapf, Dover, N. J., to The Texas Co., N. Y. City.

Lubricating oil containing a glycol di-ester of a high saturated fatty acid. No. 2,039,111. Ernest F. Pevere, Beacon, N. Y., to The Texas Co., N. Y. City.

Recovery of selenium or tellurium from petroleum sludges. No. 2,039,256. Oliver C. Martin, Westfield, N. J., and Charles W. Clark, Montreal West, Quebec, Canada.

Treatment of hydrocarbon gases using aqueous solution of a metallic salt. No. 2,039,440. Jacque C. Morrell to Universal Oil Products Co., both of Chicago.

Process of treating olefinic gases using aqueous zinc chloride. No. 2,039,441. Jacque C. Morrell to Universal Oil Products Co., both of Chicago.

Treatment of hydrocarbon motor fuels. No. 2,039,576. George W. Ayres, Jr., Chicago, to Gasoline Antioxidant Co., Wilmington, Del.

Process for dewaxing oils, using naphtha, lamp-black, and an electric current. No. 2,039,636. Lyle Dillon, Los Angeles, and Claude E. Swift, Glendale, Cal., to Union Oil Co. of Cal., Los Angeles, Cal.

Alkylation of aromatic hydrocarbons by reaction with olefin gases in presence of sulfuric acid catalyst. No. 2,039,798. Vladimir Ipatieff to Universal Oil Products Co., both of Chicago.

Synthesis of liquid hydrocarbons by polymerization of olefin gases in presence of sulfuric acid as polymerizing agent. No. 2,039,799. Vladimir Ipatieff to Universal Oil Products Co., both of Chicago.

Sulfonation of oils and greases containing oleaginous material using alkali metal acid sulfate. No. 2,039,989. Alexander Gressner, Habana, Cuba.

Solvent process for separating asphalt from lubricating oils. No. 2,040,239. Ulric B. Bray, Palos Verdes Estates, and Claude E. Swift, Glendale, Cal., to Union Oil Co. of Cal., Los Angeles.

Process for refining hydrocarbon oil using sulfur trioxide and steam in presence of zinc sulfate. No. 2,040,366. Gustav Egloff and Jacque C. Morrell to Universal Oil Products Co., all of Chicago.

Use of halogen and ammonia in the refining of hydrocarbon oil vapors. No. 2,040,395. Jacque C. Morrell and Gustav Egloff to Universal Oil Products Co., all of Chicago.

Treatment of hydrocarbon oils. No. 2,040,396. Jacque C. Morrell and Gustav Egloff to Universal Oil Products Co., all of Chicago.

Production olefine oxides by reacting olefine and oxygen in presence of silver catalyst. No. 2,040,782. Adrianus Johannes van Peski, Amsterdam, Netherlands, to Shell Development Co., San Francisco, Cal.

Production penetrating oil comprising a low boiling petroleum oil, a small amount halogenated fatty acid, and a solvent. No. 2,041,076. Bert H. Lincoln and Alfred Henriksen to Continental Oil Co., all of Ponca City, Okla.

Separation of asphalt from oil. No. 2,041,275. Ulric B. Bray, Palos Verdes Estates, Cal., to Union Oil Co. of Cal., Los Angeles.

Separation of asphalt from oil using a normally gaseous hydrocarbon solvent. No. 2,041,276. Ulric B. Bray, Palos Verdes Estates, Cal., to Union Oil Co. of Cal., Los Angeles.

Separation of asphalt and wax from oil. No. 2,041,277. Ulric B. Bray, Palos Verdes Estates, Cal., to Union Oil Co. of Cal., Los Angeles.

Use of hydrocarbon solvent in separating asphalt from oil. No. 2,041,278. Blair G. Aldridge, Los Angeles, and Basil Hopper, Compton, Cal., to Union Oil Co. of Cal., Los Angeles.

Production asphaltic composition. No. 2,041,279. Ulric B. Bray, Palos Verdes Estates, Cal., to Union Oil Co. of Cal., Los Angeles.

Recovery and purification of lubricating oils from mineral oils. No. 2,041,677. Francis X. Govers, Vincennes, Ind., to Indian Refining Co., Lawrenceville, Ill.

Pigments

Production zinc sulfide from impure water solution using the hydroxyl ion. No. 2,038,589. Thomas A. Mitchell and Royal L. Sessions to Hughes-Mitchell Processes, Inc., all of Denver, Colo.

Production zinc sulfide pigments from zinc salt solution. No. 2,038,590. Thomas A. Mitchell and Royal L. Sessions to Hughes-Mitchell Processes, Inc., all of Denver, Colo.

Production pigment paste containing cellulose derivative dispersion. No. 2,038,755. Edgar Hugo Nollau to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Production titanium dioxide. No. 2,040,823. Benjamin Wilson Allan, Baltimore, Md.

Recovery of zinc oxide from zinc bearing ores. No. 2,040,867. Thomas A. Mitchell and Royal L. Sessions to Hughes-Mitchell Processes Inc., all of Denver, Colo.

Production zinc oxide from metallic zinc. No. 2,041,237. Emanuel Feuer, Perchtoldsdorf, and Paul Kemp, Liesing, Austria, to "Smelting" Metallurgische und Metallwerke Aktiengesellschaft, Pestszenterzsebet, Hungary.

Production calcium-base lithopone. No. 2,041,618. Harold F. Saunders, Coffeyville, Kans., to The Sherwin-Williams Co., Cleveland.

Resins, Plastics, etc.

Production synthetic resins of petroleum origin. No. 2,038,558. Stewart C. Fulton, Elizabeth, and John Kunc, Roselle Park, N. J., to Standard Oil Development Co., a corp. of Del.

Production synthetic resin comprising reaction product of acetone and ortho-cresol. No. 2,038,764. George W. Seymour, Cumberland, Md., to Celanese Corp. of Am., a corp. of Del.

Production composition containing cellulose compound and a titanium salt of an aromatic polybasic acid. No. 2,038,836. Henry A. Gardner, Washington, D. C.

Production moisture-proof molded article. No. 2,039,172. Robert G. Lemmenman, Lakeline, Ohio, to The Ferro Engineering Co., Cleveland.

Production moistureproof transparent sheet material comprising a casein base coated with a cellulose ester-stearic acid coating. No. 2,039,228. Edouard M. Kratz, Gary, Ind., and William C. Wilson, Chicago; one-half to Pyroxylin Products, Inc., and one-half to Marbo Products Corp., both of Chicago.

Production artificial resins. No. 2,039,243. Hans Krzikalla, Mannheim, and Werner Wolff, Ludwigshafen-am-Rhine, Germany, to I. G., Frankfort-am-Main, Germany.

Production light amber to brown synthetic resin by polymerizing an olefine-diolefine mixture. No. 2,039,363. Charles A. Thomas to Monsanto Petroleum Chemicals, Inc., both of Dayton, Ohio.

Production pre-formed synthetic resin by polymerizing a cracked petroleum distillate with castor oil. No. 2,039,367. Charles A. Thomas to Monsanto Petroleum Chemicals, Inc., both of Dayton, Ohio.

Production infusible molded products comprising vulcanized cellulose aliphatic ester. No. 2,039,743. Samuel E. Sheppard to Eastman Kodak Co., both of Rochester, N. Y.

Dispersion of synthetic resins in liquids. No. 2,040,000. Horatio Whitehead Hutton, East Croydon, England.

Production of plastics from protein by treatment with alpha ethyl beta propyl acrolein. No. 2,040,033. Oswald Sturken, Leonia, N. J., and John C. Woodruff, Terre Haute, Ind., to Resinox Corp., N. Y. City.

Resin ester composition comprising rosin phthalic glyceride resin soluble in nitrocellulose solvents, mixed with nitrocellulose. No. 19,967—reissue. Harry M. Weber, Newton, Mass., to Ellis-Foster Co., a corp. of N. J.

Production condensation products from urea, hexamethylenetetramine, phenols, and formaldehyde. No. 2,040,207. Wilhelm Kraus, Vienna, Austria.

Production water-soluble condensation products by sulfonating condensed resinous alkali-soluble phenolic substances. No. 2,040,212. Ludwig Orthner, Leverkusen-I. G. Werk, and Arnold Doser, Cologne-Mulheim, Germany, to I. G., Frankfort-am-Main, Germany.

Method of moisture-proofing composite laminated material. No. 2,040,608. Wilhelm J. H. Hinrichs, Hamburg, Germany.

Cold, pressure-molding insulating material comprising mixture of asphaltum and oleic acid. No. 2,040,671. Linwood T. Richardson to Cutler-Hammer, Inc., both of Milwaukee, Wis.

Production resinous composition of phenol-acetaldehyde type. No. 2,040,687. Stanley Ernest Chubb, Greet, Birmingham, England, to Bakelite Ltd., London, England.

Production synthetic resin materials for use in varnishes. No. 2,040,812. Arthur J. Norton and Frank W. Less to General Plastics, Inc., all of North Tonawanda, N. Y.

Production laminated plastic material. No. 2,040,937. John W. Haught, Arlington, N. J., and Ernest Rodman, Marshallton, Del., to Dupont Viscoloid Co., Wilmington, Del.

Resistance element composed of conductive material and a vinyl resin. No. 2,041,213. Newton C. Schellenger and Willis E. Haselwood to Chicago Telephone Supply Co., all of Elkhart, Ind.

Production plastic composition which includes finely ground nut shell flour. No. 2,041,217. Vernon L. Smithers, Akron, Ohio, and Herbert A. Winkelmann, Chicago.

Production synthetic resinous materials. No. 2,041,330. Alphonse Gams and Karl Frey, Basel, Switzerland, to Ciba Products Corp., Dover, Del.

Production hot-moldable resinous compositions. No. 2,041,453. Howard L. Bender, Bloomfield, N. J., to Bakelite Corp., N. Y. City.

Production polymerization products from vinyl chloride and acrylic acid. No. 2,041,502. Arthur Voos, Frankfort-am-Main, and Ewald Dickhauser, Gersthofen, near Augsburg, Germany, to I.G., Frankfort-am-Main, Germany.

Production water soluble sulfonated condensation products. No. 2,041,560. Ernest Alfred Mauersberger, Maarssen, near Utrecht, Netherlands.

Rubber

Production rubber composition containing the rubber in solvent of hydrogenated petroleum distillate. No. 2,038,556. Carleton Ellis, Montclair, N. J., to Standard Oil Development Co., a corp. of Del.

Production stabilized acid latex containing a water soluble glycyrrhizin salt stabilizer. No. 2,038,709. Howard J. Billings, Acton, Mass., to Arthur D. Little, Inc., Cambridge, Mass.

Corrosion resistant rubber coated article. No. 2,039,069. Elgin Carleton Domm to National-Standard Co., both of Niles, Mich.

Purification of rubber distillates. No. 2,039,112. Francis Norman Pickett, Westminster, London, England, to U. S. Rubber Products, Inc., N. Y. City.

Process treating chlorinated rubber derivatives. No. 2,039,191. Philip Schidrowitz and Cyril Aubrey Redfarn to Rubber Producers Research Association, all of London, England.

Production rubber-like body by heating an alkali metal polysulfide solution, an alkaline earth polysulfide solution, and an aldehyde. No. 2,039,206. Jean Baer, Uster, Switzerland.

Production condensation products of rubber. No. 2,039,238. Herman R. Thies, Akron, Ohio, to Wingfoot Corp., Wilmington, Del.

Purification and deproteinization of sheet rubber. No. 2,040,314. Archie R. Kemp, Westwood, N. J., to Bell Telephone Laboratories, Inc., N. Y. City.

Production of rubber conversion products by contacting with free oxygen. No. 2,040,460. Wilhelm Becker, Cologne-Mulhe.m, Ludwig Orthner, Leverkusen-I.G. Werk, and Alfred Blomer, Imbach, near Opladen, Germany, to I.G., Frankfort-am-Main, Germany.

Method of retarding rubber deterioration by use of an amino fluorenone. No. 2,040,490. Werner M. Lauter, Akron, Ohio, to Wingfoot Corp., Wilmington, Del.

Preservation of rubber by vulcanizing in presence of a tertiary N-alkyl aryl naphthylamine. No. 2,040,491. Werner M. Lauter, Cuyahoga Falls, Ohio, to Wingfoot Corp., Wilmington, Del.

Vulcanization process using small amount synthetic rubber in the rubber mix, and using also a thiuram sulfide accelerator. No. 2,040,698. Robert R. Lewis, Baldwin, and Albert J. Weiss, Mineola, N. Y., to Vulcan Proofing Co., N. Y. City.

Production plastic rubber composition. No. 2,041,223. Roland R. Bollman, Mount Washington, Ohio, to The Perfect Mfg. Co., Cincinnati.

Production of vulcanizable material from rubbery substances. No. 2,041,305. Martinus Joannes Stam, The Hague, Netherlands.

Textile, Rayon

Treatment of textile materials. No. 2,038,723. Henry Dreyfus, London, England.

Production viscose rayon. No. 2,038,874. Walter Lee Savell, Forest Hills, N. Y., to The Mathieson Alkali Works, Inc., N. Y. City.

Production of impregnated and/or coated textiles. No. 2,039,176. Gustav Locker to Atlas Ago Chemische Fabrick Aktiengesellschaft, both of Molkau/Leipzig, Germany.

Artificial silk fibres and size therefor comprising starch, glue or gelatin. No. 2,039,279. Aleidus G. Bouhuys to American Enka Corp., both of Enka, N. C.

Production artificial textiles containing a white crystalline aromatic compound. No. 2,039,301. Henry Dreyfus, London, England.

Production cellulose acetate textile materials containing finely divided diacetyl tolidine. No. 2,039,302. Henry Dreyfus, London, England.

Production cellulose derivative textiles containing an insoluble resin. No. 2,039,303. Henry Dreyfus, London, England.

Treatment of artificial textiles by forming in the material an acidyl derivative of a diamino diphenyl base. No. 2,039,306. Henry Dreyfus, London, England.

Spinning solution used in production of artificial textiles. No. 2,039,307. Henry Dreyfus, London, England.

Mercerizing process in which cellulose bodies are treated with dilute aqueous solution of quaternary benzyl ammonium hydroxide. No. 2,040,065. Donald H. Powers, Moorestown, N. J., and Louis H. Bock, Bristol, Pa., to Rohm & Haas Co., Philadelphia.

Production artificial silk from viscose, cuprammonium cellulose, casein and a nitrocellulose lacquer. No. 2,040,606. Gustav Hardt, Elizabethton, Tenn., to American Bemberg Corp., N. Y. City.

Production colored artificial filaments by spinning viscose which contains a leuco vat color and a glycol ether. No. 2,040,712. Stewart Robertson, Coventry, England, to Courtaulds Ltd., London, England.

Treatment of cotton goods by polymerizing formaldehyde in aqueous solution and wetting the textiles. No. 2,040,795. William Beach Pratt, Wellesley, Mass., to John Abbott, Everett D. Chadwick, and Marcus B. May, trustees, all of Winchester, Mass.

Production treated textile material of cellulose ester type containing plasticizer comprising formaldehyde-toluene sulfonamid condensation product and a white mineral filler. No. 2,040,819. Jules Bebie and George L. Doelling to Rice-Stix Dry Goods Co., all of St. Louis, Mo.

Production of films and filaments from treated chitin. No. 2,040,880. George W. Rigby to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Degumming of natural silk materials which contain also a cellulose ester. No. 2,040,949. Henry Charles Olpin and George Holland Ellis, Spondon, near Derby, England, to Celanese Corp. of Am., a corp., of Del.

Cellulose ester composition for producing matt surfaced artificial silk threads. No. 2,040,971. Harold Allden Auden, Banstead, and Hanns Peter Staudinger, Epsom, England, to Ernest Berl, Pittsburgh, Pa.

Wood-impregnating composition comprising a non-volatile organic aromatic toxicant, a solvent, and an organic carrier. No. 2,041,647. Frank H. Lyons, Central N. Mex., to E. L. Bruce Co., Memphis, Tenn.

Water, Sewage Treatment

Purification of water by passing over lumpy, water-resistant calcium sulfite. No. 2,041,584. Martha Adler, Varlsbad, Czechoslovakia.

Preparation of Mercaptan Derivatives

New mercaptan derivatives (thioethers) applicable as solvents, plasticizers, dispersing agents and wax substitutes have been prepared by replacing the hydrogen atom of a mercaptan by a polyethylene glycol radical. A yellow water-soluble liquid with high foaming power is obtained, for example, on mixing 258 parts cetyl mercaptan (obtained by reacting sodium sulfhydrate with cetyl chloride) with 10 grams sodium hydroxide, heating to 100 to 130° C. and passing in a stream of ethylene oxide gas until the weight increases by 800 grams. A wax-like product (melting at 36° C. and soluble in both water and benzene) is formed by heating a mixture of 122 parts thiodiglycol with 5 parts caustic potash to 100 to 140° C. and adding 25 molecules ethylene oxide under pressure (French Pat. 794,830) and reported in British, *The Chemical Age*, May 9th.

Reacting Acetylene and Hydrogen Sulfide

It has been known for some time that condensation reactions between acetylene and hydrogen sulfide can occur when gas mixtures are subjected to catalytic action at high temperatures. Mixtures of thiophene, ethylthiophene, ethylmercaptan and diethylsulfide are obtained. Metals of the iron group have previously been used as catalysts. However, I. G. now has found that more uniform condensation products are obtained by carrying out the reaction in presence of liquid solvents such as polyhydric alcohols and ethers. Catalysts can be added to the reaction if desired.

Process is covered in English Patent 444,689. Catalysts used are selected from sulfides and polysulfides of alkali metals or alkaline earth metals, or sulfide compounds of metallic ammonium salts. If the acetylene is allowed to act under pressure at from 60° to 100° C. on hydrogen sulfide in an aqueous solution of potassium hydrosulfide, polymerization products of thioacetaldehyde, especially the alpha-trithioacetaldehyde, are mainly obtained. Same product is obtained using dioxane instead of water. If, however, hydrogen sulfide is led in admixture with acetylene through a solvent of high boiling point in which a small amount of potassium hydrosulfide has been dissolved as a catalyst, ethyl mercaptan, vinyl ethyl sulfide or ethane dithiol diethyl ether or mixtures of these 3 products are obtained, depending on the proportions used.

Course of the reaction is explained by assuming that at first the vinyl mercaptan is formed from equimolecular proportions of acetylene and hydrogen sulfide. This vinyl mercaptan changes into monothioacetaldehyde, with which it is isomeric. Because monothioacetaldehyde is very unstable and readily polymerizes, alpha-trithioacetaldehyde is obtained as the reaction product.

In the 2nd case, vinyl mercaptan is reduced by a 2nd molecular proportion of hydrogen sulfide into ethyl mercaptan, which is then converted by the excess acetylene into ethyl vinyl sulfide. Latter adds on a further molecule of mercaptan with the formation of ethane dithiol diethyl ether. *The Chemical Trade Journal & Chemical Engineer*, May 1.

Phosphoric Acid Purification

Electrochemical purification of phosphoric acid has been studied by Iofa, Bruskus and Venguerova (*J. Prikl. Chim.*, '35). Process involves removal of arsenic and lead impurities by electrolysis with a platinum anode, copper cathode, and bath containing cupric copper 4 times in excess of the arsenic present in the acid. Presence of copper in the bath increases the density of the cathodic deposit and the speed of separation.

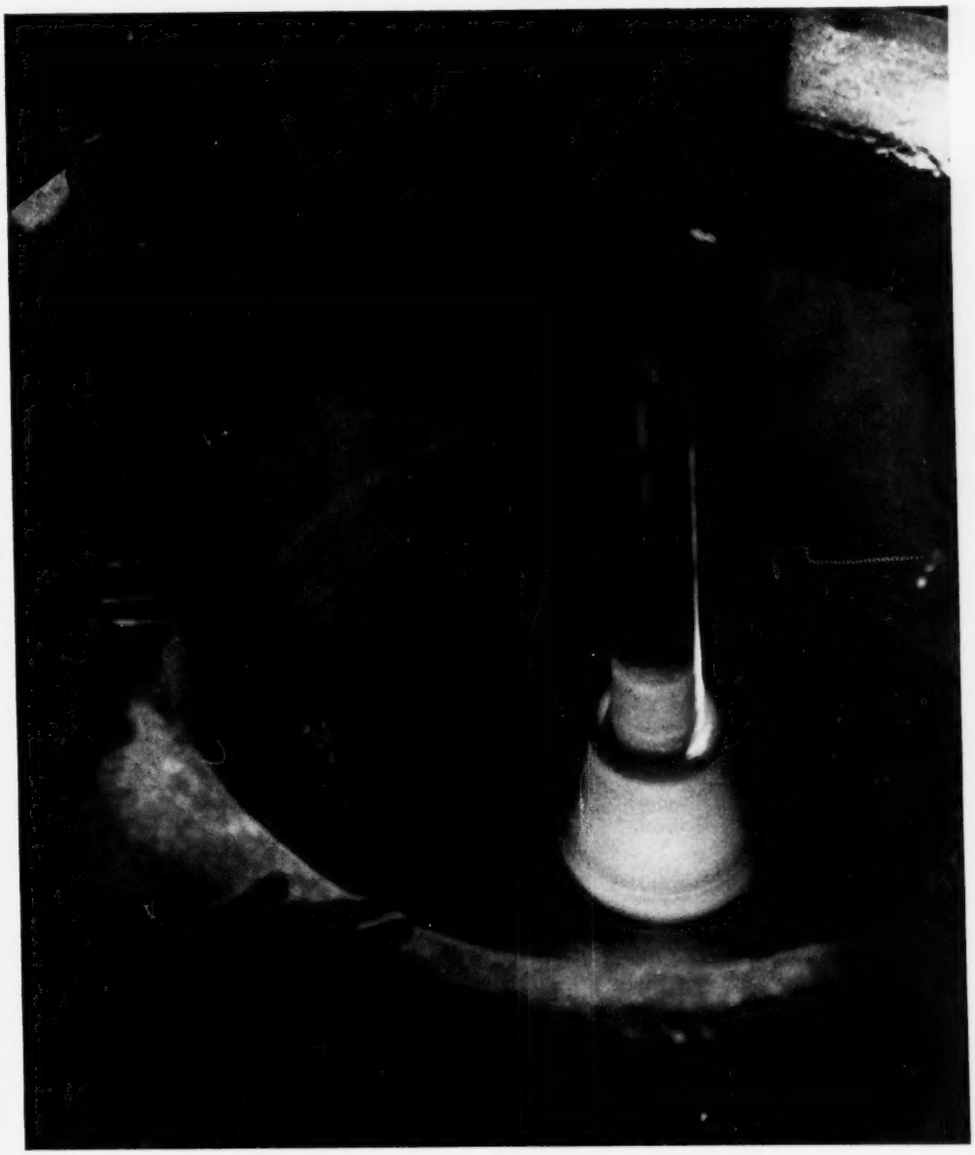
Arsenic is removed in the deposit as copper arsenide. After all traces of arsenic are removed, lead is deposited. To precipitate all traces of lead, potential of 0.355 volts should be used, and concentration of the acid should be between 70 and 75%. Mud is recovered and filtered to remove last traces of the pure acid. *Chemical Trade Journal & Chemical Engineer.*

System of Nomenclature

A Committee on Standard Symbols and Nomenclature covering unit operations of chemical engineering was created in 1932 by the council of the A. I. Ch. E. Committee was asked to survey present usage in chemical engineering literature and to recommend a standard system of nomenclature.

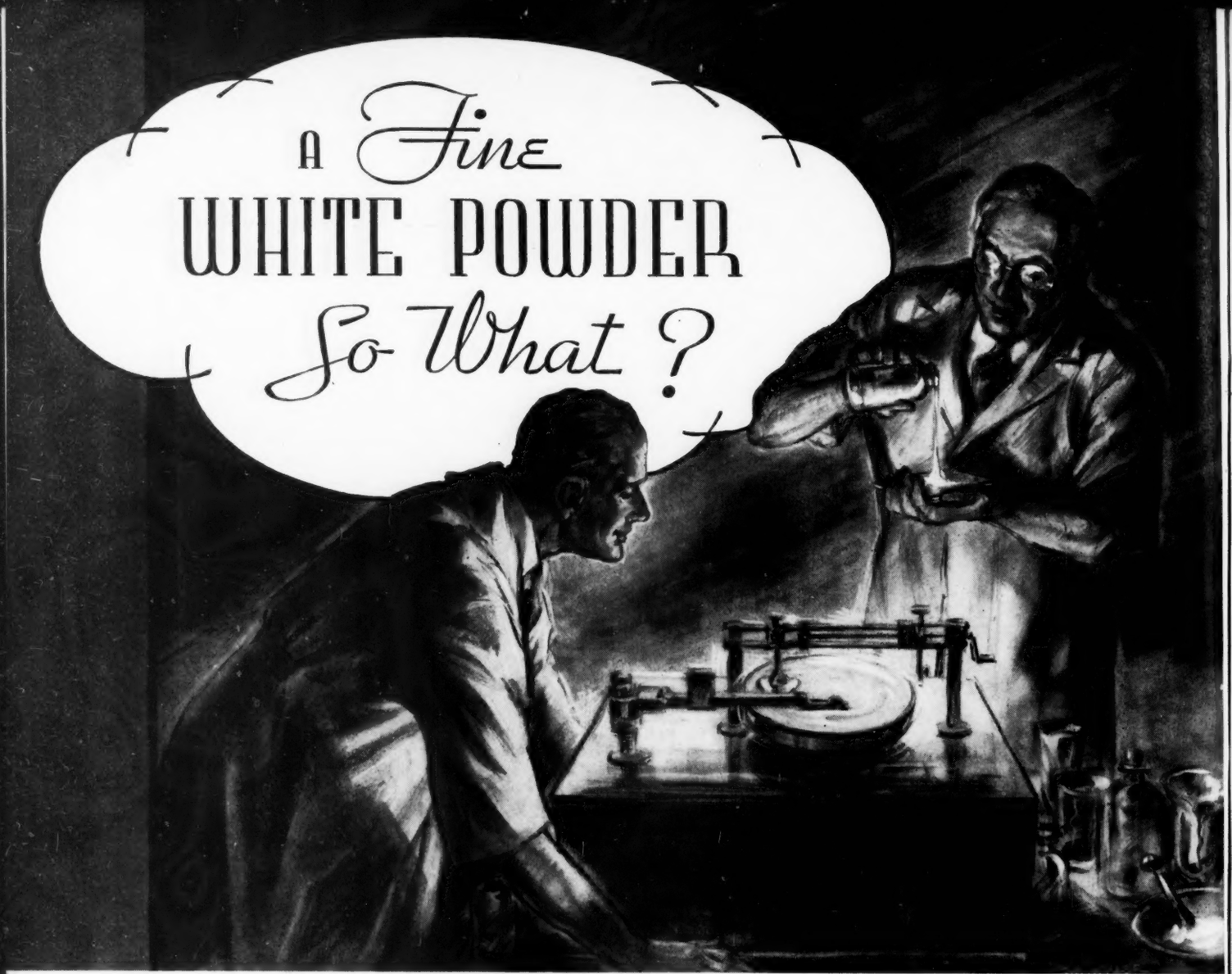
Too much emphasis cannot be placed upon the fact that the system which was reported at the October '35 meeting is tentative. Committee hopes, however, to revise and enlarge it from time to time, and suggests that improvements and additions to the list will be gladly received, and should be addressed to the chairman of the committee, A. B. Newman, Cooper Union, N. Y. City.

Plant Operation and Administration



A centrifugal machine in operation at the St. Louis, Mo., plant of Monsanto Chemical Company.

A Digest of New Methods and Equipment for Chemical Makers



Polishing Agent or Abrasive?

A sample of the material under consideration is placed upon a turn-table much like that of a phonograph. A weighed slug of metal is suspended so as to make contact with the material being tested. After a definite number of revolutions the metal slug is again weighed and examined microscopically. Loss of weight obviously indicates abrasive action. (It has been definitely proved by this method that Victor Tri-Calcium Phosphate, dentifrice grade, is non-abrasive.)

•

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"Lead Burning" Practices in the Repair of Chemical Equipment

By E. B. Partington

Lead burning (lead welding) has of necessity to be used very extensively in the repair and maintenance of chemical equipment owing to the fact that both sheet and lead pipes are used in large quantities for chemical plant construction. Plumbers' solder, moreover, is not satisfactory for jointing lead that is to be used for either the conveyance or storage of acids owing to the tin in the solder being readily attacked and joints made porous, and due to this it is necessary to make all connections between 2 or more pieces of lead by "lead burning."

Before proceeding to explain the many applications of repairs in chemical works it will be of interest to have a knowledge of the different types or systems of flame lead-burning that are available for the chemical plumber. Briefly they are:

Gas System	*Flame Temp.*
Generated Hydrogen—Atmospheric Air	Approx. 1700° C.
Coal Gas—Oxygen	Approx. 2000° C.
Hydrogen (Compressed)—Oxygen	Approx. 2400° C.
Acetylene (Compressed)—Oxygen	Approx. 3600° C.

The first-named system is now being rapidly displaced by the other methods, due to the fact that they possess many advantages from both a portability and cleanliness point of view. When the oxy-acetylene system was first introduced it was thought that the temperature of the flame would be far too hot for the welding of lead. Experience has, however, proved that the high temperature is an asset, experiments having shown that sheet lead, even though it be as thin as 1/16th of an inch (3 lb. per foot super), can be jointed in all positions, including both underhand and overhead seams. Going to the other extreme, plate lead (30 lb. per foot super and above) can be jointed very rapidly and efficiently by this method.

In a typical oxy-acetylene system the size of the cylinders would be oxygen 15 cu. ft. capacity, acetylene 12 cu. ft. capacity. The burning period of these 2 cylinders, assuming that 6 lb. per sq. ft. sheet lead is being jointed, is approximately 12 continuous hours. Where coal gas is laid on in pipe lines in works, the oxy-coal gas system can be used very economically, and will be found satisfactory for all types of work. The speed of welding is, however, not so swift as the oxy-acetylene system, and the oxygen consumption is greater.

Repairs and renewals to leadwork in chemical plants have to be executed under all kinds of conditions. Very often it is necessary to have to carry out a quick repair while the plant is working, as in chamber repairs. Here the temperature of the lead may be between 70° to 110° C. To repair a defect on the side of a chamber under these conditions the operator must be skilled in the art of lead burning, otherwise he will soon realize that the lead falls away or collapses before he has time to fuse it.

In executing a repair of this character, the 1st thing to be done is to see that the surface of the lead is thoroughly cleaned, and all oxides, sulfates, or foreign matter removed. A very useful substance to have handy is "dry powdered lime." This should be rubbed over the part to be welded with a piece of coarse sacking. The effect of the lime is 2-fold, firstly to neutralize any acid that may be about, and secondly to scour the lead and give it a bright metallic surface.

Just a word of warning, however, before attempting to commence the lead burning. Owing to the corrosive action on the lead taking place from the inside of the chamber, the defect is not noticeable from the outside until the sheet lead is very thin, and pinholes appear on the outer surface. This means that the lead to be fused with the flame is very weak, and only equivalent to 3 lb. per foot super in places. Bearing this in mind, when fitting the lead patch on to it, the lead need not be more than 5 lb. per foot super, otherwise the difficulty of having to weld thick lead to very thin presents itself.

The lead burner working on chemical equipment must be highly experienced. Photograph courtesy Installation & Maintenance Division, Andrews Lead Co., Long Island City, N. Y.

In lead burning a patch on the vertical sides of a chamber, and assuming that the lead edges have been thoroughly cleaned, the 1st thing to be done is to produce a small "sharp" flame at the blowpipe tip. This is projected onto the lead, and the underhand seam is fused as quickly as possible. The underhand seam is lead-burned 1st for the reason that the longer the flame is projected on to the lead, it expands and opens the fracture, thus allowing any acid in the vicinity to trickle in between the 2 surfaces of lead and make the fusion very difficult. The secret of making a satisfactory weld in this particular instance lies in the flame setting. It is vital that a very small sharp flame be produced, and not a large "soft" flame, as is often the case with the beginner.

Repairing of tanks and vats forms a large part of the chemical plumber's activities. These vary quite considerably in size and shape. Unlike chamber work the corrosive action of the acid upon the lead is visible each time the container is emptied.

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This enables the chemical plumber to effect a necessary repair before the lead gets too thin, so that the difficulties mentioned in chamber repairs are obviated. Here, however, he meets with different conditions. Due to the expansion and contraction of the lead brought about by fluctuations in temperature, the lead very often creeps and stretches at various points. This continues until a fracture occurs. Or, as very often happens in lead-lined iron vessels used for mixing acids, etc., the lead is punctured, either by a mechanical defect during working, or by excessive friction of the acids during the mixing process.

With the former (lead-lined tanks) the majority of these are constructed of stout timber casings, with the result that a defect or leak in the leadwork very soon shows itself on the outside. But with the latter (iron vessels and vats) a defect does not show itself so readily, owing to the ironwork being made water- and acid-tight during construction, unless it is emptied fairly frequently. This means that the lead lining, if left unsuspected, bulges and comes away from the iron shell, and allows acids and foreign matter to get in between the iron and the lead casing.

To effect a satisfactory repair in a wooden tank, it is 1st of all necessary to clean the tank out thoroughly with either water or steam to get rid of all traces of acid. The lead in the vicinity of the fracture is then cleaned, as previously stated, by using powdered lime. Should the fracture be on the vertical sides of the tank, it is necessary to fit a new piece of lead over it.

There are several methods of fitting a piece of lead to produce an efficient repair. To obviate difficult lead burning some chemical plumbers fit a patch as shown in Fig. 2. This method does away with both vertical and underhand work, and makes a very simple proposition regarding the lead burning. On the other hand, highly skilled lead burners prefer to fit a rectangular patch as shown in Fig. 3. When the latter method is adopted, the main point to watch is that the lead burning is not "cut in" at any point. This usually occurs at the edge of

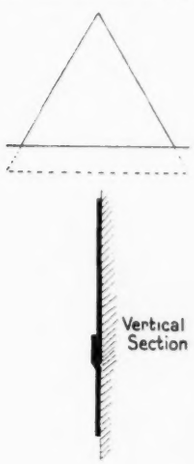

Fig. 2.

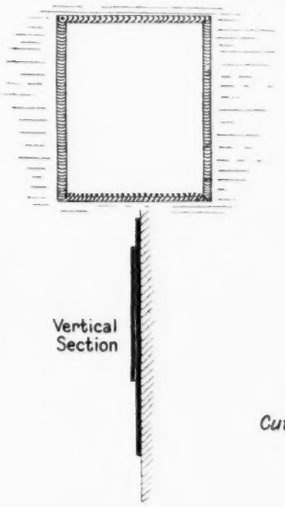

Fig. 3.

Fig. 4.

the weld on the overlapping portion (Fig. 4) and weakens the joint considerably. A strong joint should appear as shown by "B" (Fig. 4), from which it will readily be seen that the joint is the strongest point.

Where the defect is in the bottom of the tank, the plumber can either cut the fractured portion clean out and insert a new piece with the edges abutting, or he can lay a piece of sheet lead over the fracture and fuse same to the base metal. The former method is to be preferred, as it enables thorough penetration of the 2 pieces of lead when welding, and also keeps the lead patch flush with the remaining portion of the bottom of the tank. But as time is very often the important factor, the latter method is very often adopted for speed.

Before commencing to repair a fracture in a lead-lined iron vessel, the lead should be cut in the form of a cross and the four corners turned outwards to enable any foreign matter that may have accumulated being removed from between the lead and the iron. When this has been done the lead is carefully dressed back to the iron shell and the repair carried out in exactly the same manner as would apply to a wooden tank. Owing to the heat conductivity of the iron it will be found necessary to use a slightly larger flame than would be used when executing a fusion weld where there is a wooden casing.

Another type of repair in chemical works is where portability of plant is a main feature, owing to it being common practice to have to carry out a repair in most awkward and high places. To ease the situation and prevent having to run long pipe lines to convey the gases, small cylinders are used. This enables the operator to have full control of the gases at his hand, and obviates having large quantities of gases in long lengths of tubing or pipes.

The volume of gases consumed by the blowpipe flame in the various systems are as follows:

Gas System	*Gas Consumption*
Generated Hydrogen—Atmospheric Air	2-3 vol. hydrogen to 1 vol. of air.
Oxygen—Coal Gas	1-2 vol. of coal gas to 2 vol. of oxygen.
Oxygen—Hydrogen (Compressed)	3 vol. hydrogen to 1 vol. of oxygen.
Oxygen—Acetylene (Compressed)	1 vol. acetylene to 1 vol. of oxygen.

Although lead burners vary slightly in the particular type of flame that they themselves prefer, the foregoing can be taken as a general guide. British, *The Chemical Age*, May 9th, p434.

Cresols In Resin Manufacture

Like phenol itself, the cresols and polyhydric phenols condense with aldehydes, particularly formaldehyde, to form resins, the nature of which varies exceedingly in properties according to the phenol used and the conditions of the reaction. In the case of the cresols there are 2 factors of importance in applications of condensations in practice, the 1st being that a mixture of all 3 isomers is the cheapest raw material, and the 2nd that the meta-compound is far more reactive than the ortho and para compounds. The speed of condensation of meta-cresol with formaldehyde is roughly 5 times that of either of the others. This superiority in speed of reaction is shown in remarkable curves obtained by Scheiber and Sandig ("Artificial Resins," Pitman, 1931, p292), in which resin formation between pure metacresol, phenol, and a technical mixture of cresols, and formalin was plotted against time. A straight curve for pure m-cresol was obtained, reaching 100% formation in the time taken by the technical mixture to generate 20% resin. The resin from m-cresol formed under the usual conditions of condensation is very hard and resistant, and is of a pale color. So great is the action with the pure m-cresol that condensation catalysts need not be added; but with technical cresols freed from the ortho-body, the meta-compound reacts and the unaffected phenols may be removed from the resulting resin.

As early as '07 Bayer and Co. had introduced hard resins yellow to light brown in color, these being prepared from ortho-cresol and suggested as substitutes for shellac and for preparing good drying varnishes. Two years later came a patent of

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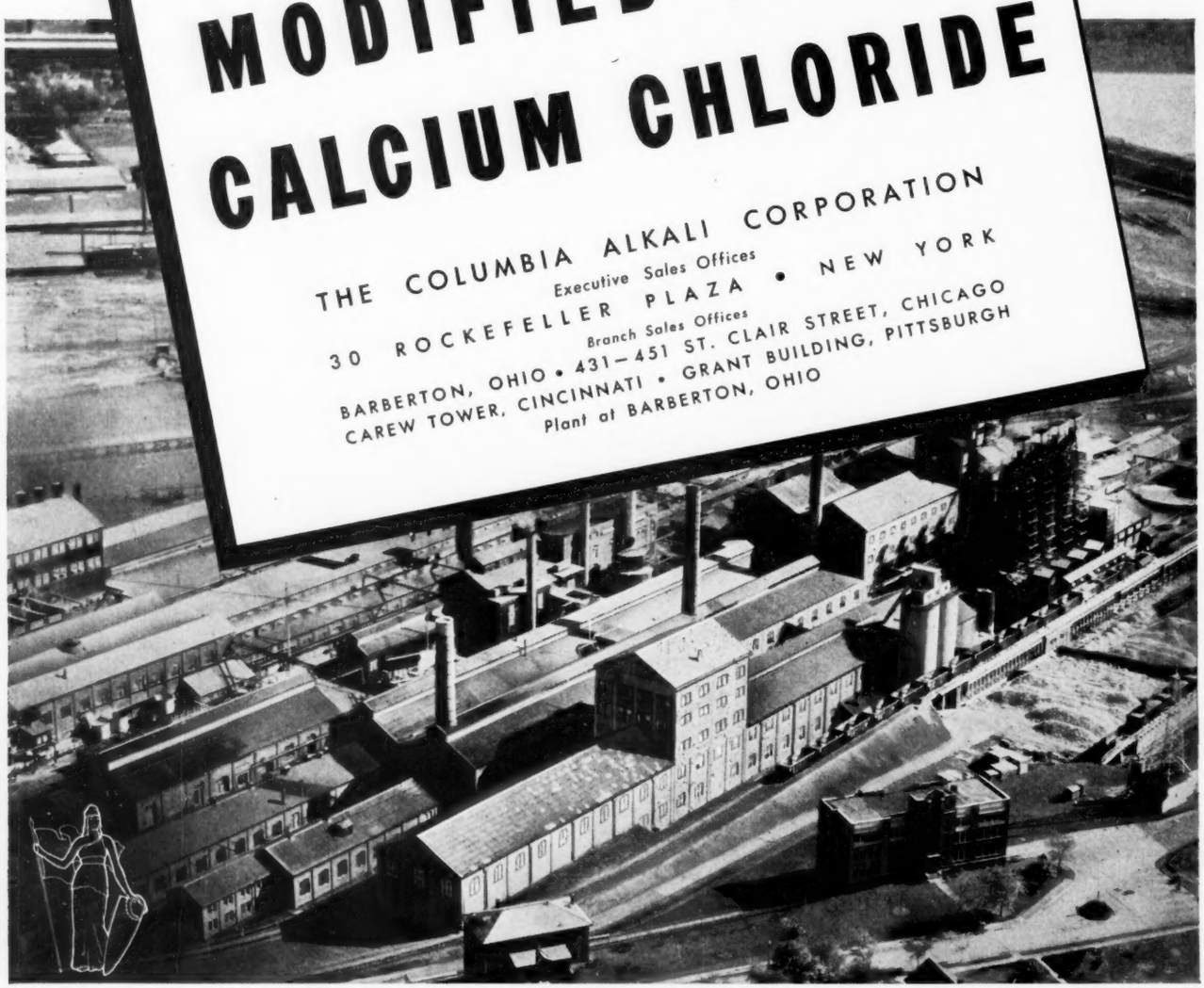

AERIAL VIEW OF PLANT AT BARBERTON, OHIO

Gentsch (U. S. Patent No. 924,449), in which were described similar resins from the ortho body and suggested for varnishes and polishes. Baeke's patents for condensing the meta compound followed, the use of acid and alkaline catalysts being proposed; while in '19 he obtained patent rights for utilizing the ortho and para derivatives or mixtures of these as plasticizing agents when included in phenol-formaldehyde resins, the cresols being added as such or 1st converted to fusible resins before incorporating them. The ortho compound is hardly suitable for mold-hardened resins, but oil-soluble resins have been obtained by autoclaving without a condensing agent, fusible and brittle ones with acid catalysts, and infusible resins when caustic soda is the catalyst. The para cresol may give fusible resins with hydrochloric acid, but they are brittle. All the oil-soluble products give insoluble resins if the treatment with formaldehyde is prolonged, and acetaldehyde or possibly other aldehydes may replace formalin. As an example of the preparation of a resin insoluble in acetone the product obtained by Hardy (U. S. Patent No. 1,287,299) may be given. In this case commercial cresol mixture was used, together with excess formaldehyde, that is, with more than one molecular proportion, and the refluxing continued until the solids at 100° C. were more than 40% of the total.

Cresols can be condensed with benzaldehyde, paraldehyde, hexamine, with acetylene in the presence of sulfuric and mercury sulfate catalysts, with sulfur alone or with sulfur and aniline, with naphthalene tetrachloride dissolved in chlorobenzene and using aluminum chloride as catalyst, with furfurol, and with a large variety of other compounds. By oxidation with air and removal of unchanged phenols with steam, the Chem. Werke Grenznach A.G. has prepared dark brown masses of varying hardness according to the conditions of the reaction. H. Stäger (Helv. Chim. Acta, 1931, p285) has advanced the knowledge of general properties of cresol-formaldehyde resins by studying those formed in the presence of alkaline catalysts, and including the properties of phenol-formaldehyde resins for comparison. He showed that the progressive decrease in the solubility in alcohol that usually accompanies heat-hardening is much less in the case of cresol resins. With increasing heat-hardening it was found that the higher the phenol content of the resin under observation the slower the initial decrease in cementation coefficient. The electrical properties also vary in the different resins and show a breakdown when the phenol content reaches 30%, this breakdown voltage being increased as the phenol content increases, except in the case of meta-cresol resins, when the increase in voltage varies with decreasing amounts of the meta-compound present. This emphasizes once more the different character of resin formation shown by meta-cresol, and Stäger states that the dielectric constant in cresol resins varies inversely with the content of meta-cresol used in preparation. He concludes that apart from the superiority of meta-cresol in being most reactive, there may also be concluded that the difference between phenol and cresol resins is a result of the difference in the degree of polymerization attained under similar conditions.

Recently there has been an outcry for giving attention to the need for further outlets for cresylic acid. It is in the conversion to resins by condensation with yet further compounds than those used hitherto that such an increase in outlets is to be sought. *British Plastics and Moulded Products Trader*, May, '36, p576.

New Process For Air Drying

A new process of air drying of industrial products has recently been developed in which no heat need be supplied within the dryer, no fresh air is used, and no wet air thrown away. Since in ordinary air drying the heat in the waste humid air represents the major heat loss, the new process which discards no hot air makes possible unusually high drying efficiencies. It depends on the moisture-absorbing capacity of a solution of lithium chloride, formerly of little commercial importance.

Air passing over a wet material gives up heat and picks up moisture. In order to carry the heat to the water to be evaporated, the air must be heated either by a preheater or by steam coils within the dryer. In the ordinary air drying the moist air leaving the dryer is hot and carries away large quantities of heat. In the new process, the moist air leaving the dryer is passed in contact with a hot strong solution of lithium chloride, which absorbs the water vapor simultaneously, and heats the air. The dried hot air is then returned to the dryer, and no heat need be supplied the dryer or preheater, except to make up for conduction and leakage through the dryer walls. This is not perpetual motion, since heat must be supplied to evaporate the water from the lithium chloride solution. To boil this solution and bring it back to its original concentration requires heat, but the amount of heat needed is only slightly greater than the theoretical heat requirement for vaporizing water from the original wet material being dried. Since no outside air is used, the operation of the dryer is not subject to the vagaries of the weather.

A typical steam-heated air dryer operating somewhat above room temperature may be said to require, for each pound of water evaporated, one pound of steam for the actual vaporization, one pound for losses by conduction and leakage, and three pounds for losses in the waste hot humid air; a total of 5 pounds of steam for each pound of water evaporated. On the same basis the new process uses approximately 2 pounds of steam; one pound for the concentration of the lithium chloride solution, and one pound for losses by conduction and leakage from the dryer. Application of the well-known multiple-effect principle to the evaporation process results in a lowering of the steam requirements for concentrating the solution, so that it is theoretically possible to reduce the steam consumption nearly to one pound per pound of water evaporated. Practical efficiencies corresponding to one and one-half pounds of steam per pound of water evaporated, or steam savings of more than 70%, are claimed. The process is being introduced commercially by well-known Midwestern furnace engineers. *Industrial Bulletin*, Arthur D. Little, Inc., May, No. 112.

Plant Operation

Operating Data on Liquid Caustic

To operating men, executives, buyers and chemists at every plant where caustic soda is used, the announcement by The Mathieson Alkali Works of a new 72-page book entitled "Cutting Costs with Liquid Caustic Soda" will be welcome news. The new book presents a thorough-going study of the economics of the "solid caustic vs. liquid caustic" question and gives much useful information on the handling of liquid caustic soda. Comprehensive technical data on sampling and analysis methods as well as on the properties of caustic soda and its aqueous solutions add greatly to the value of the book as a handy reference manual.

The book is divided into four parts, the purpose and contents of which are well described in the Foreword: "The material presented in this book is intended to serve a four-fold purpose. For the plant executive interested in a possible change from solid to liquid caustic soda, Part I contains facts which may enable him to judge the benefits of such a change in his own plant."

"For the plant operating man, Part II provides useful information on approved methods for the unloading, handling and storage of liquid caustic, including materials and types of con-

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struction best adapted to this service. The technical man will find in Part III comprehensive data on the properties of caustic soda and its aqueous solutions, including many useful tables and graphs, some of which are presented in an entirely new and more convenient form. Part IV gives up-to-date information on the sampling and analysis of caustic liquors which should prove helpful to the laboratory man." Copies are available from The Mathieson Alkali Works, 60 E. 42nd st., N. Y. City, requests being made on business letterheads.

Plant Safety and Hygiene

Safety engineers in chemical and chemical process industries and others charged with the responsibility of preventing industrial dermatitis (skin diseases) should investigate the 9 compounds developed by The Milburn Co., 905 Henry st., Detroit, for the protection of workmen handling dangerous chemicals. Company offers to analyze and advise on such problems without any obligation.

Editor Root of *Chemical Safety*, the news letter issued by the chemical section of the National Safety Council, devoted practically all of the May issue to timely hints on the handling of acids.

In a large chemical works in Great Britain an inner separate glove of stockinette is used with rubber gloves. Before the inner gloves are put on, the hands are smeared with lanoline. This step has been found necessary because the rubber gloves cause severe sweating, and skin irritation may result if some absorbent material is not worn. *Chemical Engineering & Mining Review*, Australia, Apr. 8, '36.

Fractional Distillation Under High Vacua

Investigations now in progress at Kodak Research Laboratories on working fluids for high vacuum pumps indicate that fractional distillation under high vacua may eventually play an important part in chemical manufacture and petroleum refining. Replacement of oil-type pumps by rotary mercury pumps in 1905 has concentrated much of the research since that time on mercury vacuum pump design, but recent investigations have shown that oil-type pumps possess certain mechanical characteristics which render them more suitable for high vacuum fractionation. Most recent work has been to find suitable working fluids for oil-type pumps. Extensive investigation has revealed that esters of phthalic acid possess low vapor pressures and general physical characteristics which make them particularly useful. If the pump is of suitable design, and necessary precautions are taken, decomposition of the esters can be completely avoided. Phthalic ester of normal amyl alcohol has been found to be the most useful, but esters of butyl and benzyl alcohols are also serviceable under certain conditions. Care must be exercised, however, when the pump is starting or not running smoothly, as severe strain or exposure to air have been found to result in decomposition and subsequent precipitation of phthalic anhydride crystals. *Chemical Trade Journal & Chemical Engineer*, Mar. 20.

Industrial Chemicals

Ferric Sulfate Chloride Production

Recent work by Rohm & Haas A.-G., Darmstadt, has resulted in production of ferric sulfate chloride containing water of crystallization, a salt said to be specially suitable for tanning. Method of producing the salt is covered in English Patent 444,721 and involves following procedure: an intimate powdered mixture of solid anhydrous ferrous sulfate and solid crystalline ferrous sulfate in proportions which will yield 6 molecules of water of crystallization is treated with chlorine in a closed apparatus at slightly more than atmospheric pressure until oxidation of the mixture is complete. Mixture is stirred continuously during oxidation, and temperature does not go much above 40°C. Substantially theoretical yields of the salt are obtained. *Chemical Trade Journal & Chemical Engineer*, Mar. 20.

Step in Copper Sulfate Production

Production in several French plants of basic chloride of copper as a stage in copper sulfate production is announced by Y. Mayer. Copper and cupric chloride solution are mixed in a concrete tank, being stirred by air. When reaction to oxychloride is complete, air is shut off, salt allowed to settle, and the mother liquors decanted off. These cupric chloride liquors are then used to dissolve more copper. Oxychloride in the tank is then treated with sulfuric, and copper sulfate crystallizes out. Mother liquor is decanted off and added to the liquors resulting from the first decantation.

New process is gradually replacing that based on direct solution of copper in sulfuric. Steam and labor charges are lower since copper is in process for a shorter time. Method also allows use of impure copper since arsenic is not attacked by cupric chloride solution and iron impurities are removed in the form of hydrate. *Chemical Trade Journal & Chemical Engineer*, May 8.

Nitrobenzene Purification

Purification of technical nitrobenzene previous to its catalytic reduction to aniline can be accomplished by use of certain reactions formerly used as qualitative tests for the impurities. These impurities in nitrobenzene act as catalytic poisons during conversion to aniline and are also reduced to compounds which are extremely difficult to separate from the desired product.

In English Patent 443,063, held by Lonza Elektrizitatswerke und Chemische Fabriken A.-G., Waldshut, Baden, Germany, impure nitrobenzene is treated with an organic hydroxyl-containing compound in an alkaline medium. Pure nitrobenzene is separated by distillation. Aldehydes and ketones may also be used since they are converted to hydroxyl compounds in the presence of alkali. It is said that 98 to 99% purity may be obtained. *Chemical Trade Journal & Chemical Engineer*, Mar. 27.

Method for Purifying Argon

Argon has taken the place of nitrogen as a filler for lamps, as it has a superior light transmission value of 12%, but nitrogen, because of its cheapness, is still used as a flushing agent to drive out oxygen or other undesirable occupants from the lamp bulb prior to filling it with argon. Impurities, with the exception of small amounts of nitrogen, may give rise to conditions which would result in a product unfit for the trade.

The argon purifying installation in the plant of the Penna. Illuminating Corp. consists of passing commercial nitrogen or argon from shipping cylinders through a pressure reducing valve into a system of 6 stages connected in series under 15 lb. per sq. in. pressure. The stages are (1) soda lime, (2) phosphoric anhydride, (3) copper chips, (4) copper oxide, (5) soda lime, (6) phosphoric anhydride. Each stage is made up of a cylindrical container 4 in. in diameter by 24 in. high, sealed at both ends. Stages 1 and 2 are at room temperature, 3 and 4 are immersed in a gas-fired unit and operate at 932° F., and 5 and 6 are at room temperature. The gas-fired unit is a vertical steel cylinder lined with firebrick. Pre-mixed town gas and air are directed tangentially in a well-designed combustion chamber resulting in a uniform distribution of heat. The heater has no temperature control, this being accomplished manually within plus or minus 68° F. allowable variation. This purifying plant can supply nitrogen and argon for 15,000 lamps in 8 hours. R. P. Moran, *Industrial Gas*, Vol. 14, No. 6.

New British Vegetable Oil Standards

Seven new British Standard Specifications for vegetable oils have just been issued by the British Standards Institution, in further development of the setting up of a comprehensive series of nationally agreed standards for vegetable oils.

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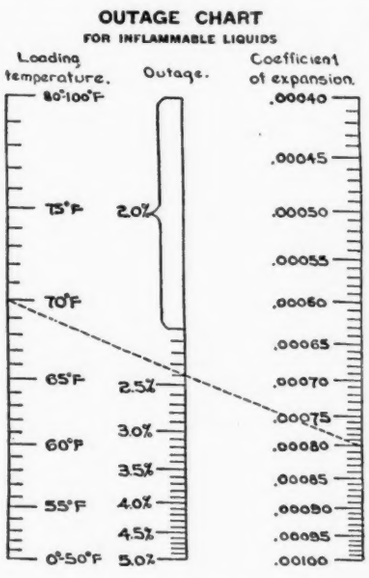
Bulk Packaging, Handling, Shipping

M C A Leaflet for Drums Released

The Manufacturing Chemists' Association has just issued a new leaflet outlining accepted practices for the handling, etc., of steel drums when filled with inflammable liquids flashing between 20 and 80° F. Leaflet discusses such subjects as explosions, bursting, removal and replacement of plug, weight limitation, marking, standard dimensions, warning labels, handling and storing, and shipping. In addition, the chart reproduced is useful in determining the outage (the space which must be left vacant to prevent leakage or distortion of containers due to the expansion of the contents from increase of temperature during transit and storage.) The outage chart is taken from the Bureau of Explosives Pamphlet No. 9 and is employed as follows: Suppose the temperature of the liquid at time of loading is 70° F. and its coefficient of expansion is .00080; lay a ruler on the chart running from 70° F. to .00080 as shown by the dotted line and the required outage is 2.4% where the ruler crosses the outage scale. Copies of the MCA leaflet, designated as Manual Sheet D-33, can be obtained from the Secretary, 608 Woodward Bldg., Washington, D. C., at 5c.



A Handy Latex Pail

Latex is the material used in a new pail recently developed for handling the corrosive acids and alkalines widely used in industry. Pail is cast directly from the liquid latex, which is compounded to give long life and resistance to destructive chemical action.

A comprehensive table issued by Dewey and Almy Chemical Co., makers of the pail, gives the results of laboratory tests with a wide variety of chemicals. Among the chemicals shown as producing no effect, even after 200 hours immersion, are glacial acetic, commercial hydrochloric, hydrofluoric, 50° sulfuric, caustic potash and caustic soda, 40% formaldehyde, and stannic chloride.

It is pointed out that the Darex Latex Rubber Pail also cuts down maintenance costs, because, being made of latex rubber, it cannot be dented, cracked, or chipped, even under the most severe usage. Walls of the pail are thick enough to prevent appreciable bulging, and reenforcement of the front wall allows the pail to be rested on a narrow edge in pouring without danger of collapsing. Spout is designed to give accurate control of the size of stream poured—from a generous flow to a tiny trickle. The stainless steel pail-handle is removable, cutting the replacement cost of the pail. From the interest already shown in this pail, especially in the dye field, it is expected that it will meet with wide acceptance in many industries where corrosion of ordinary metal, galvanized, and enamel pails has long been an expensive plant problem.

Barrel Storage Racks

An improvement has been made in the design of barrel storage racks. Engineers have designed and patented the new rail clip that permits adjustment of barrel runners so that any type of drum or barrel may be stored in a standard storage rack. Heretofore, barrel runners were bolted in place which not only meant a fixed position and no means of adjustment, but in addition, it meant weakening the cross braces by punching holes in them. This is all eliminated now with the adjustable clamp that permits moving the barrel runners in or out to conform to the container handled.

Another new feature in the new barrel rack is the new tie-rod. The new design assures stronger racks because no holes are punched in the uprights. They are one solid piece. In addition, the design properly places the tie-rods at the extreme top and bottom—where tightening should and best can be done.

A Container Easy to Pour

A container for finishing materials from which liquids can be poured easily, freely and without coming in gulps or jumps when no hole is punched to admit air above the top surface of the encased liquid has been invented by an experienced finishing foreman, Ludwig Lutter, 235 Royston ave., San Antonio, Tex., according to *Industrial Finishing*, and which was described in detail (with diagram, photo, etc.) in the May issue, p58.

New Drum Reconditioning Machine

A new machine which cleans and paints barrels and drums has been developed by Reynolds Metals Co., 19 Rector st., N. Y. City.

Rate Change for Potash

Minimum car lot rate for potash for Official Illinois and Western Classifications has been raised from 36,000 to 40,000 lbs., with ratings lowered to 40% of 1st class. Rating for Southern Classification was changed from 5th to 6th class.

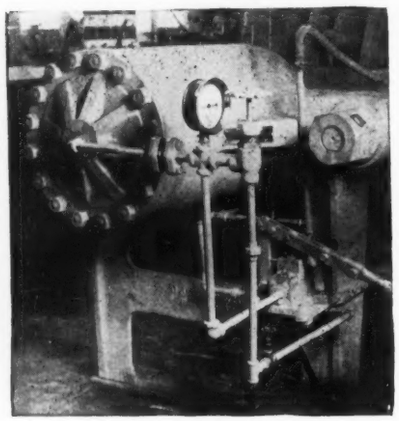
Bulk Packaging Experts to Meet

Under the sponsorship of the American Management Association (which guides the destiny of the Annual Packaging Exposition and Clinics) the subject of bulk packaging is to be discussed informally at a luncheon meeting to be held June 10th at the Pennsylvania in N. Y. City and which will be attended by a number of packaging experts, including a large delegation from the industrial chemical field, a number of editors of trade papers, and several manufacturers of bulk containers. The Manufacturing Chemists' Association will also be represented. Purpose of the meeting is to develop suggestions for a permanent organization of some sort and to lay plans for a more elaborate program on bulk packaging at the '37 exposition. A detailed report will appear in the July issue in this department.

New Equipment

Opening and Closing Filter Presses QC 357

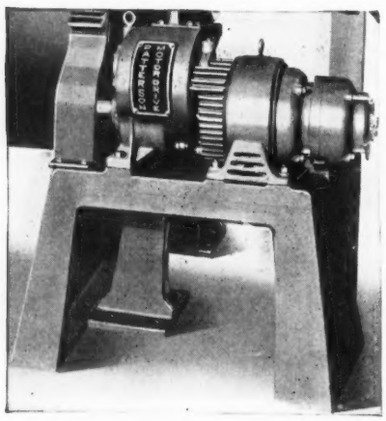
A new hydraulic device for opening and closing filter presses, said to heighten operating efficiency and reduce operating costs, has just been announced. Apparatus includes one high pressure valve and one high pressure line. Specially constructed hand pump furnishes the pressure needed, and the press may be quickly closed by turning on the low pressure valve. By using ordinary water pressure, the high pressure valve can then be opened and pump operated to provide almost any desired pressure. Accumulated pressure in the mechanism is said to be impossible.



New hydraulic device for opening and closing filter presses.

New Motor Drive QC 358

A new motor drive for pebble, ball and tube mills, tumbling barrels, rotary mixers, etc., has just been placed on the market. Drive is the built-in motor type with helical gears in the reducing unit. Magnetic brake stops the mill or cylinder by merely pressing the stop button, and by pressing the inching button, mill can be moved into exact position for discharging and reloading. Sizes from 1 to 100 H.P. are available. The versatility of this drive will appeal to plant executives in the chemical and process fields.



High Vacuum Pump Announced QC 359

A new two-stage integral type high vacuum pump is the natural result of extensive experience in meeting all high vacuum requirements, as in exhausting neon signs, lamps, radio tubes, vacuum bottles, etc., to within ½ micron. For chemical and kindred processes where there is likelihood of moisture content, as in distillation, evaporation, vacuum filtering, drying, moulding, etc., this pump has been guaranteed to maintain vacuum within 1 mm. of absolute. It is tested for a vacuum of 1/10 mm. of absolute. For chemical and allied plant service, this pump is equipped with a new water-oil separator which collects and discharges all accumulated water without affecting the vacuum produced. It is built of any required metal to resist corrosion and is constructed without valves, gears or springs to eliminate the principal trouble spot in process work.

In this pump the 2 cylinders are cast integral. Connecting piping and fittings are not required. Thus the tendency toward leakage between the first and 2nd stages of vacuum are not required. Moreover, a great deal of floor space is saved by the contact pump design. It is equipped with automatic lubrication and runs quietly. Pump is made for capacities of 8, 15, 30, 55, 100 and 200 cu. ft. per minute. Larger sizes are built to meet special requirements.

Novel Colloidal Mixer QC 360

A new colloidal mixer is on the market for the mixing and dispersing of pigment colors and clays, for reducing the viscosity of fluid mixtures and to aid in the solution of solids. The mixer will process any solution which will flow through the feed pipe and will smooth out gums, resins and fillers. Emulsions are made smoother through its action and the size of the globules is reduced. If you process gum solutions, water colors, rubber solutions or dispersions, resin or oil emulsions, or paper and textile coating solutions, you will be interested in this new unit.

Briefly, the mixer consists of 15 notched discs of unique shape which are assembled on a shaft at an angle of 18°. These discs are rotated in a cylinder at 1750 RPM. The angular setting of the discs, combined with the rotation of the shaft assembly, gives a longitudinal wiping action as well as a rotary action.

Pneumatic-Type Controllers QC 361

A well-known control instrument manufacturer announces a new series of pneumatic-type controllers known as Ampliset Free-Vane Controllers. These instruments are now available for automatically controlling temperature, time-temperature, flow, liquid level, pressure, time-pressure, and humidity. The Ampliset principle has also been combined with the Metameter, a system of telemetering recently announced by this company, for the remote control of steam pressure and gas pressure.

Pressure Switch QC 362

A new pressure switch for the automatic control of small compressors and fluid pumps is announced. Outstanding features of this switch are its compact all-metal "airstyled" enclosing case; flexibility of application, long, trouble-free operation; full automatic action; protection to motor; ease of wiring, adjusting and inspecting.

Protected Motors QC 363

Designed for general industrial service and particularly for use in foundries, cement plants, coal tipples, rock products plants, machine shops, steel mills, etc., where abrasive and metallic dust is present and in chemical plants, dye houses, canneries, packing houses, breweries, etc., where splashing liquids and mild chemicals are encountered, a new line of fan cooled totally enclosed direct current motors is announced. Sizes of the new SK motor range from 5 to 75 h.p. for 115,230 and 550 volts direct current.

"Silmo"—A New Steel QC 364

A well-known steel company has just announced a new steel designated as "Silmo," especially designed for applications where an economical combination of high temperature strength and oxidation resistance is required.

Chemical Industries,
25 Spruce St., N. Y. City.

I would like to receive more detailed information on the following equipment: (Kindly check those desired.)

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Booklets & Catalogs

Chemicals

A810. Bakelite. April *Bakelite Review*, distinguished chiefly for its cover illustration of how Bakelite materials serve the building industry, contains many photos showing new moldings for varied products.

A811. The Beacon Co., Boston. "Modern Emulsions," 32-page booklet, brings to many chemical specialties fields the latest "dope" on emulsions and suspensions for industrial specialty use. Cosmetics, sizes, polishes, agricultural sprays, cleaners, etc., are discussed, and formulas given which incorporate the proper emulsion for best results.

A812. Givaudan-Delawanna, N. Y. City. Discussion of lilac perfume raw materials is outstanding in the April *Givaudanian*. Also contains news pertinent to cosmetic industries.

A813. Glyco Products, N. Y. City. Formulas for flavors and other chemical specialties for bakers are listed in a booklet written by a well-known food expert.

A814. Innis, Speiden, N. Y. City. May *Isco News* contains some worthwhile hints for the textile trade. Booklet also includes latest prices and information of all Innis, Speiden chemicals.

A815. Monsanto. April *Monsanto Current Events* contains a fine article by Dr. Charles A. Thomas of Monsanto's Thomas & Hochwalt Laboratories which does much to clarify the endless discussion about research "value." An article on recent developments in glass fields is noteworthy.

A816. N. J. Zinc. *The N. J. Zinc Activator*, April, discusses optical characteristics of pigments used in whitening rubber compounds. Section devoted to literature references on zinc is especially valuable.

A817. National Aniline & Chemical. March *Dyestuffs* contains fine articles on the coloring of buttons, practical dyeing of knitted acetate fabrics, removal of spots from hosiery, and processing of azoic colors on cotton. Some notes on screen printing are valuable.

A818. Niacet Chemicals, Niagara Falls, N. Y. Descriptions, specifications, properties and uses of Niacet products in the 7th Ed. of their "products" booklet.

A819. Penn Salt. "Liquid Chlorine," 32-page booklet, is an excellent reference for production data, as well as for information on handling and ultimate uses.

A820. Philadelphia Quartz. May *Silicate P's & Q's* tells how silicates have been used with cement in various construction jobs requiring special cement characteristics.

A821. Schimmel & Co., N. Y. City. "Oil of Caraway," by Dr. K. Bournot, reprinted from the *Spice Mill*, Apr., '36. Article describes how the plant is grown, harvested, processed and used.

A822. Viscose Co. "What is Rayon," new booklet, answers its own question in clear, non-technical language. Of particular value to retail markets.

Monthly Price Lists

A823. Eastman Kodak. May Price List (No. 27).

A824. Fritzsche Bros. May Price List.

A825. Magnus, Mabee & Reynard. May-June Price List.

A826. Mallinckrodt. May Price List.

A827. Merck. May Price List.

A828. R. & H. Chemical Division, du Pont. April Quarterly Price List.

A829. Schimmel & Co. May Price List.

Equipment

A830. American District Steam Co., North Tonawanda, N. Y. Catalog No. 35, over 120 pages of engineering, dimensional and price data on "Adsco's" line of expansion joints, meters, steam traps, pipe casing, water heaters, and other steam distribution equipment.

A831. W. H. & L. D. Betz, Philadelphia. Methods, chemicals and apparatus for several different methods and types of water analysis are given. Prices for necessary equipment are included.

A832. Bin-Dicator Co., Detroit. New booklet by this recently organized firm illustrates operation of equipment which automatically records and controls bulk material levels in bins.

A833. Brown Instrument Co., Philadelphia. The booklet "Tune In for Process Control" deserves some sort of prize for telling, cleverly, just how simple Brown "Air-o-Line" controllers are to operate.

A834. Climax Molybdenum, N. Y. City. May, *The Moly Matrix*, discusses use of molybdenum cast iron and molybdenum steel in vital parts of Diesel engines.

A835. Commonwealth Electric & Mfg., Boston. New Price list for electric-heated full-automatic steam boilers. Listings on auxiliary equipment also included.

A836. Dings Magnetic Separator, Milwaukee. Catalog No. 25, data and illustrations for magnetic pulleys and pulley type separators.

A837. General Electric. Booklet illustrates and describes typical installations of metal-clad switchgear, type MI—6. Ideal for large industrial plants.

A838. International Nickel, N. Y. City. Spring edition, *Inco*, summarizes the many varied and modern uses of nickel. Article on Milwaukee's municipal sewage disposal plant is noteworthy, as is the historical review of nickel-plating.

A839. Johns-Manville. *The Power Specialist*, March-April, concludes the series on Johns-Manville research with the story of Transite Pressure pipe development as an aid to reducing underground corrosion. Notes on uses of other J-M products are included.

A840. Linde Air Products, N. Y. City. "Welding and Cutting High Chromium Steels," describing new methods coming into use, shows how these developments are based on studies of chromium alloy properties.

A841. Metallurgical Products, Philadelphia. Directory and Guide to metals, alloys and by-products of this metallurgical reclaiming and converting firm.

A842. Ohio Gear Co., Cleveland. New catalog describes complete line of spur, bevel, worm and other gears, and motorized speed reducers. Also includes data on gearing, S. A. E. standard heat-treatment methods, and other useful information.

A843. Pangborn Corp., Hagerstown, Md. Large, attractive pamphlet illustrates this company's dust collectors and airless blast equipment.

A844. Pulmosan Safety Equipment, Brooklyn. "Saf-T-Top" applicator bottles for applying antiseptics directly to wounds in fountain-pen fashion are described.

A845. Dr. F. Raschig G.m.b.H., Ludwigshafen-am-Rhine, Germany. Booklet describing "Resinol" a molded phenol plastic. Text is in German.

A846. Republic Steel, Cleveland. "Toncan Iron Pipe for Permanence," 4th Ed., 64 pp., contains test charts and tables dealing with threading, air conditioning, industrial maintenance and process uses, and distilling applications of this copper-molybdenum type pipe.

A847. Revolator Co., North Bergen, N. J. Booklet describing special features of this firm's portable elevators.

A848. Revolator Co. Revolator products described in Bulletin No. 89 J include portable and stationary elevators, stackers, lifters, tiering machines, lift trucks and storage tanks.

A849. Revolator Co. Bulletin 113-A, briefly describing the "Little Giant" 1000-lb. lift truck, Model K.

A850. Roots-Connersville Blower, Connersville, Ind. Bulletin 22-B12, on application of rotary positive blowers in foundry cupola service, shows construction and operation of the blowers, and lists all necessary specifications.

A851. S. O. S. Patents Co., London, England. Leaflet describes Red-drop-Periflo centrifugal mill and Pascall patent turbine sifter.

A852. Sullivan Machinery, Michigan City, Ind. Bulletin No. 88-W, describing a new line of compressed air after-coolers of multipass design.

A853. Surface Combustion, Toledo, Ohio. Form No. SC-73, describing controlled atmospheric furnaces for bright annealing.

A854. Technical Coatings, Inc., N. Y. City. Scientific protection against corrosion is discussed, and examples given. A valuable booklet with an approach preparing the customer for actual use.

A855. Van Auken-Ragland, Inc., Chicago. Attractive booklet describes "Selfvule," a self-curing plastic rubber compound for repairing conveyor belt surfaces. Protects against both abrasion and corrosion, as well as being a repair material.

A856. Westinghouse Technical Press Service, East Pittsburgh. Bulletin A-64972, "Comparison of 'Phototubes' and 'Photocells'," by Earl D. Wilson, describes nature and behavior of photoemissive and photovoltaic devices. From a paper presented before the Electrochemical Society.

A857. Worthington Pump & Machinery. Diesel engines, vertical 4-cycle, direct injection, type C.

A858. Worthington Pump & Machinery. "Freflo" centrifugal pumps for underpass drainage, type FJ.

A859. Worthington Pump & Machinery. Balanced multi-stage volute centrifugal pumps, type UX. For boiler feed service.

A860. Worthington Pump & Machinery. "A Simple Test for Your Steam Power Plant Which Shows Whether or Not You Are Losing Money on Your Feedwater Heating."

A861. Worthington Pump & Machinery. "Monobloc" pumping units, self priming, and centrifugal.

A862. Worthington Pump & Machinery. Centrifugal fire pumps, underwriter approved, for plant protection. Two-stage volute.

A863. Worthington Pump & Machinery. "Monobloc" condensate return units for building and plant service, equipped with single- and multi-stage pumps, types D and G.

Packaging

A864. Robert Gair Co., N. Y. City. A large, extremely attractive booklet describes Gair's low cost paperboard packaging, and illustrates with photos of many prominent products' packages.

A865. General Plastics. April *Durez News* gives a vivid picture of the rise in plastics use in widely separated fields. Durez illustrates about 25 unusual moldings a month, as widely separated as industrial gas masks and coffee pot handles.

A866. Phoenix Metal Cap, Chicago. This time it's France in the *Phoenix Flame*, May. Illustrations and brief articles portray "Paris in the Spring" and modern trends in packaging with equal facility.

A867. Stokes & Smith, Philadelphia. Big pamphlet describes advantages of S & S packaging machinery for a wide variety of products.

Received Late For Classification

A868. R. P. Adams Co., Buffalo. Bulletin No. 401 describes Adams filters for boiler feed water. Purpose, design, and operation of this truly original equipment is discussed. Here is a development which should be of interest to anyone in process industries, and this booklet gives all necessary information.

A869. Electro Metallurgical, N. Y. City. June *Electromet Review* tells how operating costs in many different fields are being pared by use of light weight stainless. A brief item on light weight centrifugals is noteworthy.

A870. General Electric. Folder describes G-E cubicles with FH oil blast breakers, up to 15,000 volt service.

A871. Maurice A. Knight, Akron. Large loose-leaf style booklet contains diagrammatic descriptions of Knight-Ware installations, acid proof stoneware equipment which is deairated and vacuumized.

A872. Maurice A. Knight. Knight-Ware stoneware laboratory equipment is listed with complete descriptions and specifications in this 49-page catalog.

A873. Mathieson Alkali. "Cutting Costs with Liquid Caustic Soda." Thorough review of this exceptional booklet may be found in the Plant Control section of this issue.

A874. Schimmel & Co., N. Y. City. "Annual Report on Essential Oils, Synthetic Perfumes, Etc.," '35 edition, published by the German Schimmel & Co., is probably the most complete private source of information and statistics on perfume and cosmetic raw materials available.

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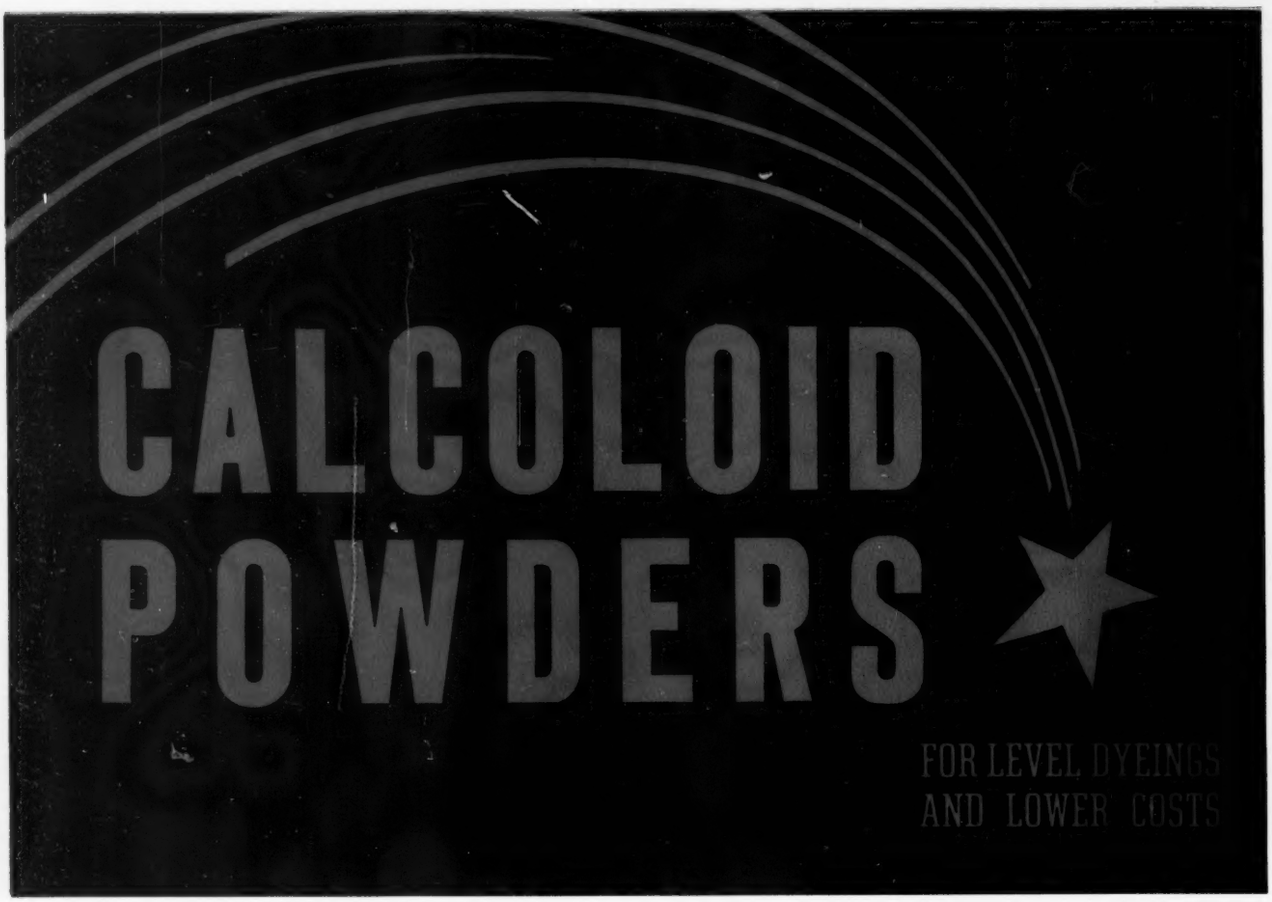

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"Murder as a Fine Art"

Not a reprint of De Quincey's famous essays, but an interview with C. Norman Dold

CHEMICAL manufacturers and petroleum refiners both have a double opportunity for scientific service with a goodly commercial reward in an old industry that is today stirring with new life.

There are in this country—at least so the officers of their own trade association estimate—about eleven hundred exterminators and fumigators. They are professional pest destroyers whose slogan is "Don't tolerate—exterminate!" Theirs is essentially a personal service business. In their trade jargon they "rid the premises" of any sort of insect infestation from roaches to termites, and they war against those dangerous and costly enemies of mankind, rats and mice. Sometimes they are called upon to perform such unusual services as clearing an attic of chipmunks or breaking up a nest of snakes under the veranda, or collecting honey deposited by bees between the walls of fine residences.

Their weapons are substances that have toxic and non-toxic qualities—solids, liquids, and fumes—and they not only apply these weapons, but in almost every case they manufacture or mix them, or a great part of them, in their own working laboratories. Thus they are a regular market for a wide variety of chemicals, inert fillers, and solvents that range from barium sulfate and the new insecticidal fluorine compounds to talc and red squills, cyanides, and creosote derivatives.

Of late years their very ancient art has been rapidly becoming more and more scientific in its technique. More than this, their trade practices are at the same time fast being modernized. The result is a rather radical series of changes, often unappreciated among themselves, but important to understand.

C. Norman Dold is a first-class appraiser of these changes. As president of the National Association of Exterminators and Fumigators, he is titular head of the trade. But he is no figurehead. Overflowing with nervous energy, his college-trained intelligence continually seeks diligently for sound solutions to his industry's problems.

"We exterminators and fumigators," he answered our direct query, "are having progress pressed upon us at a rate that gives us indigestion. In spite of the distressing symptoms, it is a healthy process. What we need is help in assimilating the diet of modern ideas in formulas and in applications; in business principles and legislative control that are being thrust upon us."

He leaned back in his chair and clasped his hands behind his head, and continued.

"About five hundred of our industry of eleven hundred are able to take it. They are alert and sincere. They are really interested in the business. They understand that a successful, profitable concern must render service which is the only permanent basis to build upon. They want to learn about new materials and better methods. They conduct their affairs upon sane business principles.

"The others, the ones who can't take it, the chaps who live in the horse and buggy stage and who are too careless or too lazy to come up to stream-line standards, well"—he snapped his chair forward and its front feet thumped emphatically on the floor—"I'm afraid it's just too bad. The pace is so swift, they are going to be left behind.

"As a matter of fact, our business is being revolutionized by two sciences: entomology and chemistry. Even greater changes are ahead when the knowledge that entomologists and chemists glean is better correlated and when these scientific data are properly mixed with good business. This is the assimilation I mentioned.

"An entomologist may know the exact number of the segments in the antennae of 'steen species of cock-roaches and be intimately informed on the love life of the bedbug; but he is apt to have a very sketchy knowledge of how safely and surely to rid a big restaurant kitchen of roaches or how to formulate and manufacture a usable bug killer. The chemist may have at his fingertips the physical properties and chemical reactions of the latest petroleum solvent and yet be quite ignorant of its uses in an insecticide. Too often neither entomologist nor chemist is enough of a business man to sell a raft to a drowning man.

"All this different knowledge and these diversified talents must be mingled and blended. We exterminators must learn from the entomologist more about the anatomy of insects, their feeding and breeding habits, their complicated life cycles, and the most effective methods of their extermination. From the chemists we must learn more about reactions and incompatibilities, the new poisons and other substances together with their proper place in our formulas."

He paused and looked out the window. After a moment's thought, he turned, smiling cheerfully, and added, "We don't appreciate how lucky we are! We have a lot of learning to do to keep our jobs up to the highest efficiency made possible by those sciences; but those scientists are mighty generous teachers. They are anxious to help us. The big chemical and petroleum companies put laboratory and experimental facilities at our command that most of us cannot afford to maintain for ourselves. We help them too, I believe, by bringing to their research men practical problems it is worth money to solve."

The entire industry represented by this trade association president is watching with keen interest the working out of a law governing the exterminator and fumigator passed six months ago in California. It is a stringent measure, requiring examination before the licensing of operators. It was material, therefore, that the subject of legislation should be broached.

"Personally," Mr. Dold said, "I am not in favor of a law just because it is a law, for I cannot see that laws will cure every ill. Some laws are pretty plainly devised simply to

create jobs as inspectors for a lot of political henchmen. Other laws are devised to protect the public without proper understanding of why and how such protection is necessary. There have been a few laws advocated that would be directly prejudicial to our industry. A good law is written in the public interest and enforced without discrimination against any group. We are for such laws. We are against laws written by politicians and faddists.

"Akin to laws is our problem of insurance, which in the field of employers' and public liability for those of us who do fumigating is getting to be an almost prohibitive expense. A qualified operator, working with proper apparatus and proceeding with due care, does not create the abnormal risks which many people seem to think are a necessary part of any fumigation job. There is real need for some carefully collected statistics in this field.

"Any one who knows ABC about this business knows that the determining factor in the safety and effectiveness of any job we do rests with the competence of the operator. That's why the National Association of Exterminators and Fumigators welcomes an honest licensing system for properly qualified operators. That's why we are opposed to farcical examinations or licenses that can be obtained by pull or graft. They deceive the public and give all honest, capable firms a bad name. That's why too, I am glad to say that courses in practical, applied economic entomology are being given in recognized universities and state colleges. For the self same reason, that is why we disapprove of those mail order diploma mills which in ten lessons and for twenty-five dollars—don't forget the twenty-five dollars—grind out so-called Exterminator Engineers!"

Determining Turpentine Adulterants

Determination of petroleum and coal tar adulterants in turpentine is easily accomplished by a new analytical method developed by Stanley Keltle and reported in J. T. Baker Chemical's *Chemist Analyst*. Twenty cc. of the sample, 10 cc. of water and 20 grams of potassium bromate are placed in a distillation flask, and hydrobromic acid (S. G. 1.59) is added in small quantities at a time, while the mixture is cooled, until a permanent yellow coloration is obtained. A further quantity of hydrobromic acid is then added, without cooling, until the total amount introduced is 50 cc. Mixture is then refluxed for one hour at 40-50° C. and then steam distilled. As soon as drops of oil heavier than water begin to come over, the distillation is stopped, the water is separated from the distilled oil, the latter is shaken with fuming sulfuric acid, and, after separation of the 2 layers, the volume of the distilled petroleum spirit is noted. The treatment with sulfuric acid is necessary in order to remove small quantities of brominated terpenes, etc., originating from the turpentine.

For coal tar oils 100 cc. of the oil under investigation are saturated with gaseous hydrochloric acid at a low temperature. The pinene hydrochloride is filtered off, and the filtrate is distilled under reduced pressure, until about 25 cc. have come over. Any tar oil, such as toluene, xylene and solvent naphtha, will now be concentrated in the distillate. This is then added in small quantities of 100 cc. of sulfuric acid containing 4% of free SO_3: the mixture is heated to 70°C. for 20 minutes, cooled, diluted with water, and distilled with steam. Pure turpentine yields about 0.5 cc. of a yellow oil of refractive index 1.5. If petroleum oil is present, it is isolated at this point, and can be recognized by its odor. When oil ceases to distill the steam is disconnected, and the mixture distilled directly, warm water being added drop by drop. Hydrolysis of the sulfonated oils begins at about 115°C., and the free hydrocarbons distill over. Process is stopped at 170°C. Volume of oil recovered in the distillate is then multiplied by 2.2, and this figure represents approx. the percentage of coal tar oils in the sample.

The Literature

Articles of interest to the chemical and process industries particularly noted in a monthly review of the U. S. and foreign periodicals.

Ammonia. "Liquid Ammonia Research in 1935—A Review," by Norman O. Cappel and George W. Watt. Extensive investigations of amino acid reactions using liquid ammonia are stressed in this technical review. Recent work in inorganic fields is also briefly outlined. *Journal of Chemical Education*, May, p231.

Casein. "Casein Wool," by W. Von Bergen. A report on the source, composition and properties of this new "wool" synthetic fibre, according to reports from the Rome office of the Bureau of Foreign and Domestic Commerce and work carried on by the author himself. *The Dyer & Textile Printer*, April 24, p411.

Cellulose. "The Production of Artificial Sponges from Cellulose Derivatives," by Dr. Gustav Bonwitt. Brief discussion of production methods is coupled with an outline of advantages which artificial sponges are said to show over the natural product. *British Plastics & Moulded Products Trader*, April, p501.

Dyestuffs. "Novel Uses for Dyestuffs," by Pegasus. This brief article on widely varied uses of dyes makes interesting light reading, and at the same time stimulates the imagination. *Textile Colorist*, p301.

Electroplating. "Bright Zinc Plating," by R. O. Hull. Comparison of the relative merits and electroplating characteristics of zinc and cadmium. Hull discusses briefly the fundamentals of plating, present applications, and the limitations of bright zinc plating. *Metal Cleaning & Finishing*, April, p169.

Fuel. "Steam Generation in Chemical Works," by G. E. Foxwell. An argument against the "always on tap" theory of steam generation in chemical plants which causes needless expense to manufacturers each year. Detailed discussion describes economical and efficient operation of the steam boiler. *The Industrial Chemist*, April, p163.

Gas Purification. "Elimination of Sulphur from Flue Gases." Article tells in part how this problem was solved at Battersea Power Station in England. *The Industrial Chemist*, April, p157.

Glass. "Organic Glasses," by Prof. G. T. Morgan, N. J. L. Megson, and E. Leighton Holmes. Discussion of the use of recently developed transparent synthetic resins as glass substitutes. Properties of each type resin are briefly discussed, with emphasis on optical properties. *Chemistry & Industry*, April 24, p319.

Leather. "Deliming Chrome Sides," by "Prefex." Practical deliming operations in actual use are described. *The Leather Trades Review*, April 8, p461.

Lead. "Deep Lead Mining in Victoria," by G. B. O'Malley. Descriptions and specifications of the Talbot Alluvials Ltd. operations in Canada. *Chemical Engineering & Mining Review*, March 9, p171.

Lime. "A Suggested Method of CO_2 Recovery from Gas-Fired Lime Kilns." Growing industrial importance of solid carbon dioxide as a refrigerant prompts this by-product article. Flow-sheet and accompanying discussion ably illustrates the suggested process. *Rock Products*, May, p70.

Motor Fuel. "Chemists Disagree on the Use of Alcohol-Gasoline Blend as Satisfactory Motor Fuel for Modern Cars." A digest of salient points brought out in this important discussion at the recent A. C. S. Kansas City meeting. *The Oil & Gas Journal*, April 23, p14.

Nitrates. "History of the Chile Nitrate Industry—I," by M. B. Donald. An enthralling, thoroughly documented history of one of the world's most colorful industries, packed with adventure and intrigue. *Annals of Science* (British), Jan. 15, p29.

Nitrates. "History of the Chile Nitrate Industry—II," by M. B. Donald. *Annals of Science*, April 15, p193.

Paint. "Aluminum Powder in Paint Formulation," by Robert I. Wray. How aluminum paints have solved some tough painting problems. *Paint, Oil & Chemical Review*, April 16, p34.

Pigments. "Mineral Earth Colors," by G. H. Erwin. Article lists mineral earth pigments now in common use, their properties, sources, and tells how they are obtained. *Paint, Oil & Chemical Review*, April 16, p22.

Plastics. "Soya Bean Plastics—I. Henry Ford's Major Development," by Herbert Chase. A complete outline of Ford's process, containing many valuable photographs showing production and molding of the plastic. *British Plastics & Moulded Products Trader*, April, p516.

Plastics. "The Historical Development of Phenol-Formaldehyde Resinous Products—I," by A. J. Buck. Brief historical notes, interesting because of their British viewpoint. *British Plastics & Moulded Products Trader*, April, p499.

Plastics. "Buttons to Buildings," by Herbert Chase. Romantic reading from the plastics field. *Review of Reviews*, March, p36.

Shipping. "Bracing Cooperage Shipments," by William H. Herring. Second in a series of articles on cooperage shipments, this part dealing with the "anchored load" and "floating load" methods of bracing. *The Wooden Barrel*, April, p14.

Sulfur. "Sulfur Deposits of the Sierra de Gador, Province of Almeria, Spain," by David Williams. More than simply an outline of problems being encountered at this sulfur deposit, article is an excellent geological summary of all sulfur deposits, embracing possible origins, extraction problems, etc. *Bulletin of The Institution of Mining & Metallurgy*, April, p13.

Sulfuric Acid. "Sulfuric Acid from Sulfuretted Hydrogen." This outline of a simple contact process discusses the combustion of sulfuretted hydrogen, choice and method of using the catalyst, and methods of condensation. Illustrations of equipment actually in use are included. *The Industrial Chemist*, April, p167.

Tanning. "Sheepskin Tanning." Methods of production and control in current use by British plants are discussed by several British manufacturers and chemists. *Canadian Chemistry & Metallurgy*, April, p94.

Wetting Agents. "Wide Application of Wetting Agents," by "Pegasus." Article includes a discussion of recently developed dyestuffs which are in themselves wetting agents. Other uses of wetting agents in fields other than textile are described. *Textile Colorist*, p322.

"Getting On The Air"

The Correct Procedure For Utilizing the Radio as a Sales Promotion Agency

"CHEMICAL Specialties On The Air," an article which appeared in the April issue of CHEMICAL INDUSTRIES, reported on several of the more outstanding and representative programs of chemical specialty manufacturers now being broadcast. The thought was then expressed that the most satisfactory method of determining the potentialities of the "mike" as an advertising medium for the specialty maker was a study of existing programs and a review of a wide variety of "case histories."

If the ballyhoo and strictly "sales talk" are eliminated, the advantages of the radio as an advertising medium may be summarized as follows:

1. The radio audience is a voluntary audience;
2. It listens habitually to the programs it likes;
3. It listens, normally, in groups;
4. In return for the pleasure it receives, the audience gives the sponsor appreciation and friendship;
5. The use of sound makes a vivid and lasting impression;
6. The human voice lends to the announcement the persuasive power of personal selling;
7. The commercial announcement (the sponsor's "sales talk") is given against an emotional background created by the entire program.

Let us assume then that Mr. Specialty Maker has listened attentively to a number of the broadcasts suggested, and is sufficiently impressed with the arguments in favor of the radio as a sales promotional agency to delve further into the "mystery" of getting on the air.

The prospective buyer of radio time is no longer asked to buy "a pig in a poke." There now exists a wealth of data available, culled from the experiences of hundreds of manufacturers in many fields. The huge chains, NBC, CBS, and Mutual, and even the modest independent stations scattered from Maine to Florida and from Coast to Coast, have amassed statistical information which can be evaluated quantitatively. This information can be obtained directly from the stations themselves or from the broadcasting departments of many advertising agencies. Assuming then that a chemical specialty manufacturer is firmly convinced that broadcasting does present in his particular case definite opportunities for increasing sales, what are the actual mechanics of getting on the air?

Such questions as to whether or not an advertising agency specializing in radio will be given full charge, or whether the advertising department of the company will function alone, or the broadcasting system's facilities will be depended upon, or whether some combination of the three will be given the responsibility must then be decided. Stations or systems must be picked, a program arranged, the commercials adopted, the tie-ups with other advertising prepared. The ritual is or should be pretty nearly the same whether the manufacturer is a large national concern planning a coast to coast hook-up or a small producer preparing to go on a "Toonerville Trolley" local station. And at the risk of possibly being charged with an illogical arrangement of the subject matter of this article, a word or two on the subject is included at this point. It is quite fatal not to know definitely beforehand what the total cost is to run. There should not be any "extras" cropping up.

What is the best or perhaps the safest way of getting on the air successfully? The answer will vary with the circumstances. When the programs are to go out over a national or a large sectional hook-up, in other words where an extensive campaign is desired, then the services of the radio specialists of the advertising agencies are practically a "must." For somewhat less pretentious efforts the service departments of the broadcasting companies can be safely depended upon, and for purely local spot broadcasting the manufacturer's advertising department may admirably fill the bill. But, in any event, no matter how the situation is handled an executive of the company together with the advertising manager should "sit in" on all conferences. They should certainly have a hand in the determining when the new program is to go on the air, how many stations, and which stations, are to carry it, what type of entertainment should be offered the public. It is they who should know just what ends they wish to achieve; if they have a clear conception of what they want to accomplish, the job is much simpler and the results are more likely to be satisfactory. This all seems like logic of the "two times two equals four variety," yet the one big universal complaint of radio specialists is that their clients often Do Not have a definite set of objectives.

Much, of course, depends on the amount of money appropriated for the radio campaign, and on the nature of the product. Certain advertisers in the chemical field wish not so much to promote the sale of a single product as to build good will, and a wide interest in the accomplishments of their firm. If so, probably the best results will be achieved with an evening program or a Sunday afternoon to attract family audiences. The duPont "Cavalcade of the Air" and Sherwin-Williams' "Metropolitan Opera Auditions" are two classic examples of this type of program. On the other hand, a company manufacturing soaps, paints and varnishes, disinfectants, cleansers, etc., may decide that since the selling message is to be directed chiefly to housewives, it may be better to take advantage of the lower rates effective for a daytime program. There are a number of examples of this type of program, and one of the most outstanding in the chemical specialty field is the Climaline half-hour from 11:30 to 12 noon over the NBC-WEAF Red Network. In any case the sales department, the sales promotion department, and the research department can be of material assistance.

Choosing the Program

The type of program decided upon will depend partly on the nature of the campaign, and partly on the time selected, since the effectiveness of a broadcast is definitely influenced by the programs which precede and follow it on the air. In what income group does the client expect to make the most sales? What class of listener does he want his program to attract? When all of these questions are answered, then the selection of the type of program and the artists can be undertaken.

The radio departments of the advertising agencies or the artist bureaus of the broadcasting systems are capable of supplying almost any type of talent required. Sometimes a sustaining program has built such a popular following that a client, having decided that it is just what he wants, can take it over intact. Kate Smith, Morton Downey, Bing Crosby and Alexander Woolcott gained sponsors in this way. It is difficult to give specific data on the cost of artists for programs. An Eddie Cantor program with all the trappings will run well above $5,000, but there is no lack of supply of good programs and good artists at more modest sums. In a word talent can generally be found to suit the pocketbook of the sponsor. The growth of electrically transcribed programs has been remarkable and may offer the proper solution for the smaller specialty manufacturer.

When it comes to the purchase of radio time from the stations the prospective purchaser can obtain rate cards similar to those published by newspapers and magazines. From the chains he can obtain rates for the entire system and also for the individual stations in the chain. In each case the rates are broken down for definite periods, such as one hour, half hour, and quarter hour. A complete one hour evening hook-up on the Red Network with WLW included (64 outlets) will set the sponsor back $15,920; the small manufacturer can get on local stations for a quarter hour with a cost running from a

few dollars up to $400 for NBC's WJZ or WEAF in New York. He can in some cases purchase smaller periods of time for correspondingly smaller amounts.

Naturally, space does not permit of an exhaustive report on the involved subject of broadcasting, and merely the high spots can be touched upon and a few warnings or suggestions given. The latter may be briefly summarized as follows: 1. Obtain expert advice, preferably, if possible, from an agency specializing in radio broadcastings. 2. Consider broadcasting activities simply as one division of your promotional activities and make certain that there is an effective plan drawn up in advance to tie in these activities into a well-rounded comprehensive advertising program. 3. Have a definite set of objectives for your radio expenditures. 4. Have a responsible officer of the company constantly in touch with every phase of the project. 5. If samples or literature or premiums are to be used be sure that adequate machinery is set up in advance so that there are no delays in responding to the hearers' requests. 6. Prepare a budget so that total costs will be known in advance. 7. Periodically pause to make a thorough investigation of results. As nearly as it is possible to estimate chemical specialty makers spent around $2,000,000 in 1935 for radio advertising. A check-up with a large number of such companies discloses that the overwhelming majority found that their money was well invested, that the returns were satisfactory, and that those companies which followed most closely these few simple suggestions obtained the best results.

One last thought for the small chemical specialty maker. Radio can be utilized effectively, just as effectively as by the larger companies, if the mechanics are handled intelligently. It isn't a game that the players need sit in with big stakes. A company does not necessarily have to possess national or even sectional distribution facilities to obtain satisfactory results from the use of the radio. The smallest manufacturer operating locally can often increase his sales economically with the judicious use of small stations.

Flame-Proofing Textiles

Artificial fibres when in the form of wearing material are not inflammable to a dangerous extent, but when used for other purposes—for instance, decoration, stage effects, aeroplane and balloon coverings—it is necessary to lower still further their ability to take fire, by impregnating them with substances that isolate them from the oxygen of the air, that is, such substances as release inert gases under the influence of a high temperature. Among the numerous salts that possess this property, those that have an adverse effect on the color or on the strength of the tissues cannot be used. Hygroscopic salts, which may cause mildew, are also inadmissible unless efflorescent substances are added. The most active flame-proofing substances are the salts of ammonium, borax, and chloride of magnesium.

To overcome the solubility of the impregnating salts, which makes them liable to be washed out by rain, for instance, they are made insoluble by double combination; for instance, a tissue is treated with stannate of soda, then passed through a bath of sulfate of ammonia, thus producing oxide of tin. This at the same time makes the tissue less permeable to water. The goods are rendered completely impermeable by treatment with colored asbestos preparations or cellulosic varnishes.

A cheap recipe for light rayon tissues is based on sulfate and borate of ammonia:

Sulfate of ammonia	80	grms.
Carbonate of ammonia	25	"
Boric acid	30	"
Borax	20	"
Starch	20	"
Water	1000	"

The goods are passed at full width through the bath which is kept at about the boil; they are then centrifuged and dried at a low temperature. The colors must be fast to washing to stand this treatment, which in itself gives no resistance to washing.

Light fabrics can also be treated with a 5% solution of sulfate of magnesia or of borax. By using boric acid a cold bath can be employed. Girald recommends:

Sulfate of ammonia	125	grms.
Borax	15	"
Boric acid	5	"
Water	1000	"

This recipe is simple, but it does not give rise to insoluble mineral substances.

Sulfate of lead and acetate of alumina can also be used. In a French patent (565,577) Hirchlen obtains a mineral precipitate of this kind by impregnation in 2 baths. The 1st bath contains insoluble sulfate of lead formed by double decomposition: 7.5 kilos acetate of lead, 4 kilos alum, 1,000 liters water. The sulfate of lead fills the pores of the tissue, the acetate of alumina impermeabilizes the tissue. This 1st bath is given at 50°C. The goods are squeezed and passed into the 2nd bath which contains:

Sulfate of ammonia	18	grms.
Borax	5	"
Boric acid	3	"
Alum	2	"
Water	100	liters

The goods are squeezed and dried.

Another process is based on the formation of hydroxide of zinc. Pass the tissue through a concentrated solution of sulfate of zinc (35 kilos in 70 liters of water). Impregnation should have about 70% of the sulfate in the tissue. After squeezing pass into a 2nd bath containing 15 liters of ammonia, 16° Bé., in 30 liters of water. This produces precipitation of sulfate of ammonia and hydroxide of zinc on the fibre. The oxide of zinc formed on drying gives a 100% charge on the fibre. This treatment gives little resistance to washing. The charge is fixed by passage through a bath of gelatin followed by passage through a bath of tannin.

A good flame-proofing finish is given with tungstate of soda which melts on heating and covers the fibre with a pellicle. To prevent crystallization in the impregnating bath 3% of phosphate of soda on the weight of the goods is added. In the Perkin, Whipp and Todd process tungstate of aluminum is used.

To render the tissue at the same time impermeable to air and flame-proof a treatment is given with a 5% solution of silicate of soda mixed with a 2% solution of sulfate of alumina. The goods are squeezed and dried and insoluble silicate of alumina is formed.

In another process the goods are treated 1st in a solution of phosphate of ammonium, then in an ammoniacal solution of chloride of magnesium. The compound on the fibre is insoluble in water. The goods are rinsed to eliminate the chloride of magnesium in excess.

Another process consists in giving a 1st bath of stannate of soda 14° Bé., then drying and passing into a 2nd bath containing:

Tungstate of soda 35 deg. Bé.	4	parts
Acetic acid 9 deg. Bé.	1	"
Chloride of ammonium 4 deg. Bé.	3	"
Acetate of zinc 17 deg. Bé.	2	"

After centrifuging and drying, the acetic acid is evaporated by hot calendering. In all these treatments it is necessary to take into account the effect on the handle of the goods.

Rayon and other artificial fibres can also be flame-proofed in the process of spinning. The best plan is to use insoluble metallic salts which, under the action of heat, release gases capable of extinguishing flame. These salts must have the property of melting at a temperature below the combustion point. Digested in *The British Dyer & Textile Printer* from an article by R. F. Urban in *Die Kunsteide*.

Pyrethrum—A New Crop

By R. E. Culbertson

Research Fellow, Crop Protection Institute, Sponsored by Stanco, Inc., Manufacturers of Flit

PYRETHRUM is the name commonly applied to the insect powder plant, *Pyrethrum cineratiaefolium*. It is the base of most of the household insecticides, such as Flit, Fly-Tox, Venom, Black Flag, Bee Brand Insect Powder, etc.; is found in an ever increasing number of agricultural sprays and dusts, such as Red Arrow, Powco Dust, Flit Garden Dust, etc., and is of pharmaceutical importance, especially for intestinal worms. I am informed that it is the only material which will eradicate pin worms in poultry. It kills both sucking and chewing insects (paralyzing the nerve centers) but is harmless to both man and animal. Pyrethrum is the only effective insecticide not a potential hazard to health and life.

The first pyrethrum flowers were imported in 1855 and now we use approximately 13,000,000 lbs. annually. About 90% of this amount comes from Japan and the rest, mostly from Dalmatia, now part of Yugo-Slavia on the Adriatic Sea. Incidentally, Dalmatia is the native home of pyrethrum.

Why not grow and harvest pyrethrum flowers on our own lands and with our own labor? Here is a non-competitive crop. Can it be grown? If so, where? And will the toxicity of the flowers be as high as from flowers imported?

The findings indicate that pyrethrum behaves as an annual in the extreme south (77-97 degrees west longitude); a biennial a little further north; and as a perennial under favorable soil conditions between 37 and 50 degrees N. latitude. In the western states pyrethrum may be grown as a perennial further south due primarily to elevation and lower rainfall.

Our tests show that the toxicity of American grown flowers runs as high and in most cases higher than imported flowers. In fact, last year, crops from selected strains ran from .54% to 1.02% pyrethrin. High toxicity flowers is one way of meeting foreign competition and we now have seed to plant up to ten acres each of 23 strains of high value.

In talking about toxicity it is interesting to note that the pyrethrin content of the flowers appears to be little influenced by:

1. Geographical location of the area where grown.
2. Elevation.
3. pH of the soil.
4. Soil type.
5. Fertilizer treatment.

European literature abounds with statements to the effect that flowers run higher in toxicity when grown on soils of pH7 or slightly alkaline, but this statement does not hold true in our experiments. One is led to believe that toxicity is independent of where the plant is grown or the treatment received. Similar treatments in Pennsylvania so far have failed to show any relation between fertilizer treatments and toxicity. A new series of 60 plots was laid out in 1935 as a further check on this work.

Weather does affect the pyrethrin content. Invariably the analyses will run high in a hot dry season with lots of sunshine, and low in a rainy and cloudy season.

In all experimental work with pyrethrum care must be exercised to harvest the flowers at the same degree of openness, since the stage affects the toxicity perhaps more than the treatment. Flowers should be cut when they are ¾ to fully open but not blown. The degree is measured by the disc florets which open from outside circumference towards the center.

Effect of Stage of Disc Florets on Toxicity

Sources of flowers	Disc Stage	Tox.	Disc Stage	Tox.
Raleigh, N. C.	1/2 open	.45%	3/4 to fully	.76%
Norfolk, Va.	1/3 open	.29%	2/3 to fully	.48%
Williamstown, N. J. ..	1/4 to 1/2	.47%	3/4 to fully	.76%

Coupled with the decrease in toxicity, there is an increase of as much as 100% in weight between the closed and ¾ to fully open stages. Partly ripe flowers are still heavier, but are lower in pyrethrins. Plants themselves vary in pyrethrin content, so in order to reduce experimental error to a minimum, sibs from tested plants should be used whenever possible.

Other facts of interest are that: 1. There is no loss in pyrethrins when flowers are dried artificially at 140° F. or under. 2. Flowers dried on the stems and stripped when dry test the same as dried flowers stripped while green. 3. Plants grown side by side from seed secured from France, Algiers, Switzerland, England, Austria, Dalmatia and Japan show little or no difference in toxicity. 4. At the proper stage of harvesting, the proportion of green flowers to stems usually runs 35-40% to 65-60%. This changes when dry to 30-35% flowers to 60-35% stems. 5. Flowers run somewhat higher in pyrethrins when dried in the shade than dried in the sun. 6. Plants live longer and do better when the stems are cut off ¾ inches from the ground at time of or shortly after harvest. Stems on plants left for seed should be cut off right above the new crown. 7. Propagation on a commercial scale by division of old plants is impractical. 8. That pyrethrum is subject to several diseases which have been studied. For those wishing to grow pyrethrum, set your mind at rest on this point—it will not become a noxious weed. Neither will it be harmful to bees or livestock. In fact, the stems may be used as hay.

Cost of Seed $1.50 Per Acre

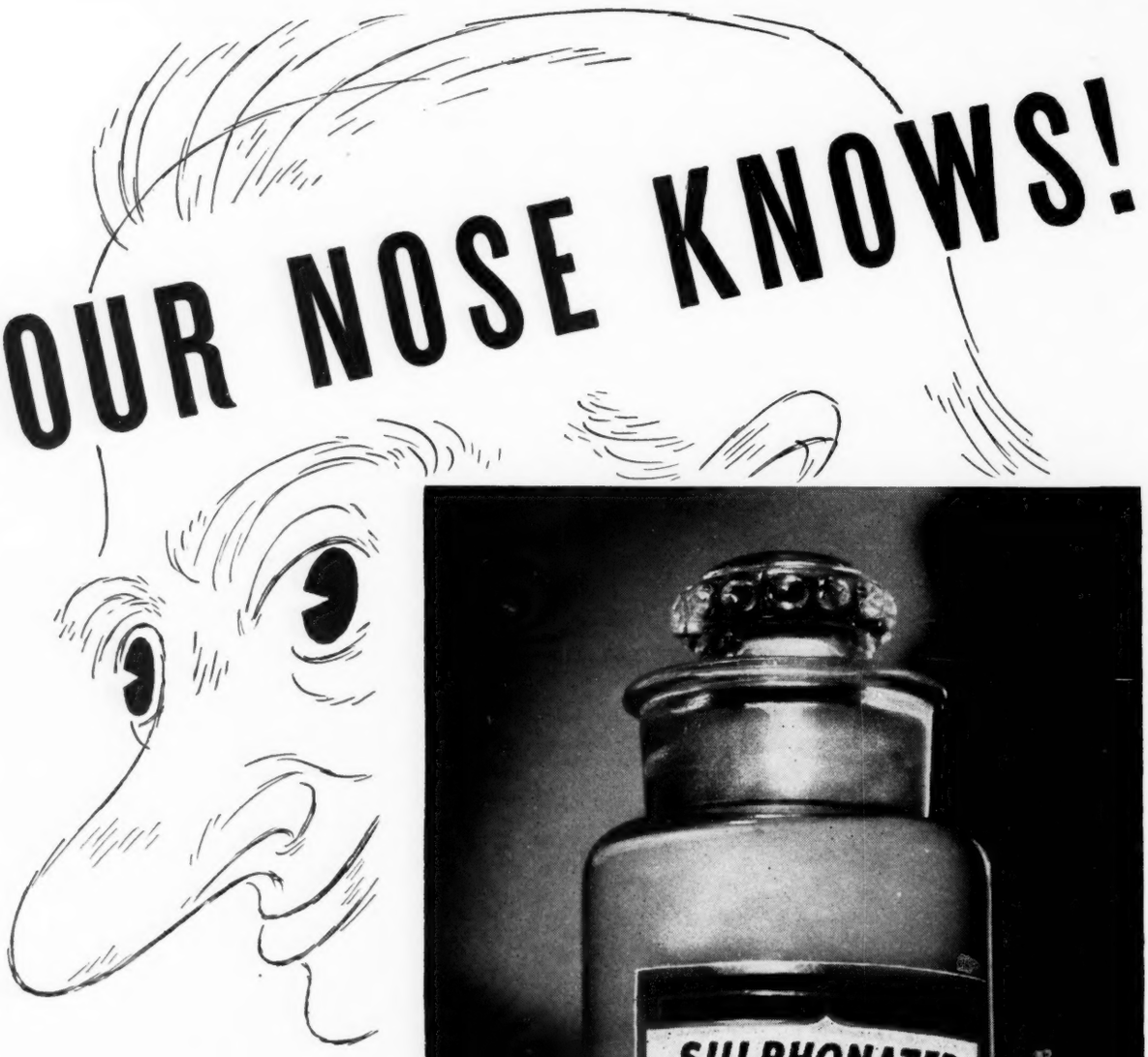
One planting, under favorable conditions, will last from 5-8 or more years and the cost of seed is only $1.50 per acre. The growing costs run from $30.00 to $60.00 per acre depending on whether the plants are checkered or in rows, the rate of planting, fertilizer requirements, presence of weeds, rainy or dry season, age of plants, etc. The returns run anywhere from $40.00 to $125.00 per acre depending upon the age of the planting, stand, soil, and of course, the market price.

At the present time, flowers are the chief article of sale and yields run from 400-1200 lbs. of dried flowers per acre. The price varies according to the Japanese supply and the exchange rate of the Yen, but one may ordinarily expect from 10-18 cents a pound for fancy flowers. Stems have value and it is only a matter of time until a market for them will be developed.

In anticipation of a question relative to the 1936 Japanese supply and price, the 18th Flower Broker's Meeting at Fukuyama City Apr. 12 estimates a new crop of 14,955 tons with a carry over of 4,295 tons, or a total of 19,250 tons. The price quoted was highest 12c per lb. cif New York. Lowest 5¾c with an average of 7½c. This average price does not justify American production but at 12c per pound, the farmer can make some money. If the low prices continue, as has been suggested, the Federal Government should grant a subsidy to farmers to encourage them in the growing of pyrethrum so that we can be independent of a foreign supply. This method was used to foster production in Japan.

* Address delivered at the 2nd Annual Meeting of the Farm Chemurgic Council, held at Dearborn, Mich., last month.

YOUR NOSE KNOWS!



NO AFTER-ODORS—
FULL SUPPLE FINISH

• Sulphonated Olive Oil W-700 is absolutely pure Olive Oil. Our special methods of sulphonation make this product completely soluble and highly sulphonated. It is resistant to salts and organic acids—is low in neutral fat —high in SO_3 content. Sulphonated Olive Oils are also available in other adjustments to meet your specific requirements.

JACQUES WOLF & CO.

MANUFACTURING CHEMISTS AND IMPORTERS . . . PASSAIC, NEW JERSEY

Warehouses: **Providence, R. I.; Philadelphia, Pa.; Utica, N.Y.; Chicago, Ill.; Greenville, S.C.; Chattanooga, Tenn.**

Household Specialties

Exterminators Save on Insurance

The National Association of Exterminators & Fumigators has through the cooperative effort of the members effected worthwhile savings in insurance rates which became effective June 1st. Members have already been informed but fumigators desiring detailed information should communicate with the secretary, William O. Buettner, 3019 Ft. Hamilton Parkway, Brooklyn.

The association has added 48 new members to the rolls since Feb. 1st. The officers extend a cordial invitation to all exterminating firms that believe in sound business principles and ethical methods to join. The annual convention will be held in Cleveland at the Statler, Oct. 26th-28th.

Formula for Mosquito Repellent

The N. J. Experiment Station reports successful development of a larvicide which can be used to repel mosquitoes at outdoor functions. It contains a light petroleum oil and pyrethrum and is harmless to fish, waterfowl, and vegetation, is toxic as well as repellent to adult mosquitoes, and can be economically applied to partially or completely protect an outdoor gathering such as carnivals, picnics, open-air theaters, lawn parties, etc., from annoyance by spraying the area with the larvicide diluted 1:10 or 1:12 with water and without discomfort to the audience. Spray is applied ½ hr. before the gathering takes place with a power machine under 100 lb. pressure per square inch as a fine fog, covering the grass, ground, shrubs, and filling the air. Thus far, the larvicide has been found effective against *Culex pipiens, Aedes vexans,* the salt-marsh mosquito, and *Mansonia perturbans.* Formula, which has been improved to be compatible with hard and salt water, consists of 100 gal. of kerosene containing pyrethrum extract equivalent to 1 lb. of flowers (analyzing 0.9% pyrethrins) per gal., 50 gal. of water, and 6 lb. of sodium laurel sulfate (emulsifier). J. M. Ginsburg, Science, 82 (1935) No. 2134, p490.

New Products Announced

"Wonderpaste Remover," a new interior and exterior paint remover which is applied by brush and easily stripped off, is being made by Wilson-Imperial Co., Newark, N. J. Manufacturer believes this new paint-removing process leaves the wood in better condition than would be the case if a blow-torch were used.

Nickel & Chromium Products, N. Y. City, is marketing "New Chromex," a polish for chromium plate, stainless steel and aluminum, which is said to be safe and non-slaking.

Charo, placed in the refrigerator, will absorb rancid odors and keep food from spoiling; a product of the Requa Manufacturing Co., Inc., 193 Atlantic ave., Brooklyn, N. Y.

"NoKoroso," a non-inflammable and non-poisonous compound preventing corrosion on battery poles and terminals, will be produced by Milton Mendel, Plainfield, N. J. Product has already met with success in Florida markets.

B. F. Drakenfeld & Co., N. Y. City, has developed a new glass-etching compound, "Screen-Etch," which permits etching of design through a screen. Etching is accomplished within 3 minutes, company reports.

Bonner Mfg., Detroit, has started production of "Odor-Go," household deodorant spray, and "Externo," an odorless insecticide.

Pet Products, Indianapolis, recently organized to produce "Dude" dog shampoo, has named Federated Sales Service, Boston, to aid in building up a nation-wide distributing and sales force.

With the Specialty Companies

The Modern Way Produx Corp., a new industry in Hendersonville, N. C., has started production in its new plant, and within a short time will be shipping large quantities of Bella Dura, and other products. Bella Dura is an automobile polish and paint preserver. Products which will be manufactured have previously been made in Detroit.

Colgate-Palmolive-Peet, along with 3 other complainants, will appeal to higher court for reversal of judgment in their case against Weissbard Bros., cut-rate drugs, Newark, alleging unfair trade practice. N. J. courts, in upholding the defendant, found the non-contractor provision of the N. J. fair trade act to be unconstitutional.

Gadi, Inc., Memphis, Tenn., shoe dyes and polishes, buys the division of Compo Chemical, Boston, which makes satin dyes, sheen, and cleansers. Research laboratories of both companies will be combined at Memphis with J. F. Lindberg in charge of the satin-dye division. Sam Rubin will remain in charge of satin-dye sales.

Dept. of Agriculture Food & Drug Division's charge that DePree Chemical, Holland, Mich., was mis-labeling its moth-proofing compound was not contested by Willard A. Diekema, president. Company pleaded guilty without intent to break the law, and was assessed a small fine.

Roberts Chemical, Philadelphia, producer of rug and upholstery cleaners, polishes, household insecticides, etc., is adopting a direct producer to consumer sales program. Plan includes direct mail order sales and public demonstrations by Roberts' salesmen.

Acme Chemical, Milwaukee, making cleaners, disinfectants, varnishes, dyes, etc., suffered a $35,000 fire loss last month, when a metal bung slipping from a cask containing cleaning fluid caused explosion and subsequent fire.

Noxx Chemical, Columbus, Ohio, producer of "P. S. T." and "Noxx" insecticides, moves from 1133 E. Main st. to the southeast corner of Lazelle and Cherry sts.

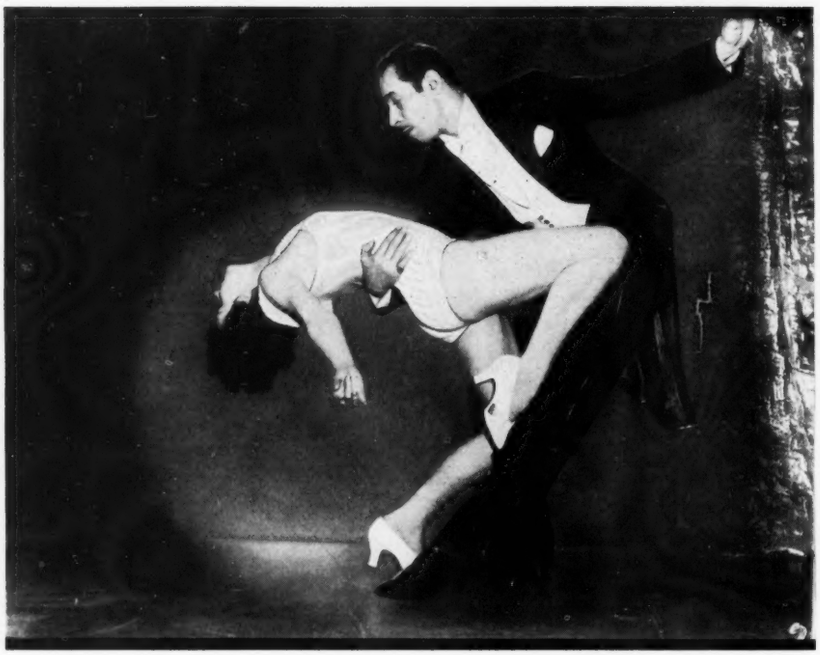
Edgar A. Murray Co., Detroit, producer of Doom insecticides, re-appoints Fred M. Randall Co., also of Detroit, to direct its advertising.

Fuld Brothers, Inc., Baltimore, Md., have announced publication of their 64-page catalog, sparkling with the newest and most popular sellers in the chemical supply industry.

Endo Chemical, Greenville, S. C., has been organized to make termite and other insect exterminating chemicals. New company is owned and managed by T. K. Bowles.

Promotional Activities

Du Pont will take advantage of the recent trend toward monogramming by offering 2 sets of initials for motor cars in exchange for a tag attached to top of Duco Polish, Duco Cleaner, and Duco-Wax cans. Spring and summer copy in the *Saturday Evening Post* will push the campaign which is being handled by Batten, Barton, Durstine & Osborn, N. Y. City.



Shinola dramatizes the slogan "Look! It won't rub off." Tide, a magazine edited in the "Time" manner for the advertising field, estimates the white shoe polish market at between $5,000,000 and $7,500,000 annually. Steadiest users are 200,000 nurses who use 6 or 7 bottles a year. The average family buys 3 bottles a summer.

Shinola is planning a nation-wide expansion of its "double your money back if it rubs off white shoes" advertising drive for its well-known white shoe cleaner. Company conducted a test campaign in Florida during the winter season which was eminently successful, with but one request being made, and that one a case of mistaken identity. Magazine and newspaper full-page copy will be used to push the "no rub-off" quality. Batten, Barton, Durstine & Osborn handle the account.

Osmic Chemical, Brockton, Mass., makers of Shu-Shine Polish, appoints Redmond Co., Boston, to handle its advertising account. Plans call for a consistent newspaper campaign.

The T. & T. Co., Peekskill, N. Y., appoints Mackay-Spaulding, N. Y. City, to direct advertising plans for its product "Down Deep," a waterless hand and face cleanser. Plans call for newspaper and radio test campaigns in New England.

Neva-Wet Corp. of America, N. Y. City, is planning to boost sales of its water-repellant preparation for fabrics by stimulating interest in ski-ing apparel. Plans call for a "show boat" cruise to France and Switzerland, starting late in October, which will take a party of about 400 retail executives to Europe to study fashions in winter sports clothing.

Recent estimates reveal that Colgate-Palmolive-Peet is responsible for one-third of the $2,000,000 tie-up advertising being used in connection with the maiden voyage of Cunard's *Queen Mary*. Benton & Bowles handle the Colgate account which is offering trips to Europe aboard the *Queen Mary* as prizes in a Palmolive soap contest. Contest itself has been under way for several weeks.*

Miscellaneous Notes

Soap imported in cakes or bars must be individually marked to indicate country of origin, regardless of how it is packed, according to recent Customs Bureau ruling.

Printers' Ink Monthly for May gives a very comprehensive list of companies using premiums. Included in the list are a large number of well-known chemical specialty manufacturers.

Kansas City exterminators have adopted the cooperative manner of advertising.

West Disinfecting appoints Robert O. Kelly as Arizona representative, with headquarters in Phoenix.

This Month's Specialty Section Cover

*** Fannie Brice, well-known stage and radio star, appears on the Palmolive radio program.**

Harold Buffington has been appointed Pacific coast representative for R. R. Street & Co., soaps and spotting compounds.

Flour Fumigation with Hydrocyanic Acid

Vacuum fumigation of flour products with hydrocyanic acid is described by H. D. Young, G. B. Wagner, and R. T. Cotton. For general purposes it is believed that a dosage of 8 oz. for every 10,000 lb. of flour products for a 3-hr. exposure will be effective against all stages of the flour beetle. This dosage is based on the use of a vacuum of 28 in. and with flour temperatures of 70° F. or higher. *Jour. Econ. Ent.*, 28(1935), No. 6, p1049.

Agricultural Specialties

Copper Silicates as Insecticides

Complex copper silicates as pest-destroying agents are prepared by heating an aqueous suspension of finely divided hydrated silica with cupric hydroxide, basic cupric carbonate and basic cupric sulfate. A suitable hydrated copper compound may be obtained by precipitating a dissolved copper salt with alkali carbonate, an aqueous suspension of the precipitated product being mixed with finely divided colloidal hydrated silica. A soluble copper salt may be added to an aqueous suspension of hydrated silica, alkali then being added and the mixture heated. A copper salt may be added to an alkaline suspension of the alkali silica product described in British Specification 357,993, or a suspension of siliceous material may be treated with alkaline earth hydroxide and the alkaline earth silicate treated with a copper salt Suitable silica products for use in the process are described in Specifications 294,681, 299,483, and 357,993. Reference is also directed to Specification 370,889. English Patent 442,664, P. Spence & Sons, Ltd., Manchester, Eng.

Cryolite Dust as an Insecticide

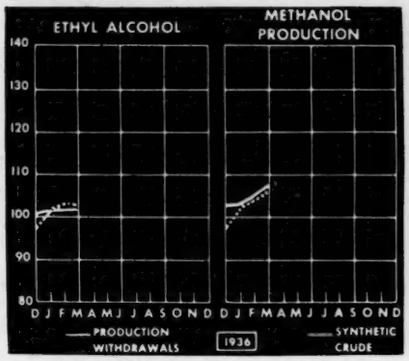
Trials have recently been carried out in the State Plant Pathological Research Institute in Lyngby, Denmark, on the use of cryolite dust as an insecticide. Promising results are reported as having been obtained in connection with both citrus fruit and sugar beet.

ADVERTISEMENT—*This entire page is a paid advertisement.*

SOLVENT NEWS

Reg. U. S. Pat. Off.

JUNE ★ A Monthly Series of Articles for Chemists and Executives of the Solvent-Consuming Industries ★ 1936



(moving twelve-month averages, 1935 = 100)

		1936	1935
ETHYL ALCOHOL			
Production			
1000	Jan.-Mar.	39,825	34,901
proof	March	13,899	12,844
gals.	February	12,747	9,767
Withdrawals			
1000	Jan.-Mar.	36,686	34,658
proof	March	12,320	14,620
gals.	February	11,770	8,603
METHANOL			
Crude			
Production	Jan.-Mar.	1,461	967
1000	March	473	351
gals.	February	494	300
Synthetic			
Productio	Jan.-Mar.	4,590	3,733
1000	March	1,631	1,303
gals.	February	1,540	1,127

NEW TYPE OF PRINTING INK UTILIZES VOLATILE SOLVENTS

A new type of printing ink for modern high-speed printing requirements has been announced to the printing industry. Sold under a trade name, this new product is the result of research having for an objective "quick-drying and better printing."

Reported to be based on a new process for ink manufacture, the rapid vaporization of the volatile constituents of the ink by the application of heat leaves only relatively dry solids on the surface of the paper.

Unlike ordinary inks, the new product contains highly volatile solvents, selected for their rapid evaporation at slightly elevated temperatures. These solvents are "relatively inert" at room temperatures, and therefore will not dry on the press.

Advantages claimed include elimination of traveling tympans and slip sheets, prevention of offset, and clearer impressions on the printed page.

The Philadelphia office of the U. S. Industrial Alcohol Sales Co., Inc., has recently been removed to new offices in the Terminal Concourse Building, 401 North Broad Street. The Bell telephone number is Market 3176 and the Keystone number is Race 5726. The office was formerly located at 800 North Delaware Avenue.

A special synthetic lacquer has been developed to coat aluminum phonograph records. A very hard surface is said to result and the record is almost noiseless in operation. The coating is not easily scratched.

TEXTILE INDUSTRY FINDS PYROXYLIN COATINGS AID IN EXPANDING MARKETS AND PROFITS

Application of Nitrocellulose Solutions to Cotton and Other Fabrics Opens Many New Fields

Pyroxylin coated textiles have made a major contribution to the textile industry in its efforts to maintain its position in the face of increasing inter-industry competition.

With the advent of rubber bathing suits, lastex yarns and fabrics, transparent cellulose ribbons, paper towels and napkins, spun glass clothing, metal auto tops and airplane bodies and wings, and cardboard boxes replacing cloth bags, the textile industry has experienced a new form of competition from non-textiles. To counteract the replacement of established products by non-textiles, the industry has turned to find new markets and to improve products by increasing sales appeal. Cotton fabrics for road construction, rayon substitutes for glass windows and acoustical fabrics for sound-proofing are among the new markets opened. However, one important counter attack has been by the use of specially processed pyroxylin-coated fabrics.

The Major Markets

These represent products for application other than the many uses of artificial leather. The major markets include waterproof draperies, shower-bath curtains, coverings for furniture, bridge table covers, waterproof table cloths, waterproof fabrics for book covers, suitcases, window shades, and handbags. The potentialities of the market are illustrated by the fact that more

(Continued on next page)

INDUSTRIAL ALCOHOL INDUSTRY BEGAN THIRTY YEARS AGO

The beginning of the Industrial Alcohol Industry dates from the passage of the Denatured Alcohol Act of June 7, 1906. This law first allowed the sale of alcohol for industrial purposes without the payment of a Federal Tax.

Tax-free denatured alcohol not only benefited industries using alcohol as such, but opened the field for development of low-cost alcohol-derived chemicals.

In 1906, the industrial uses of alcohol were few. It was employed in a limited way for lighting and heating, and its possible uses for production of coal-tar colors, varnishes and lacquers, ether, and "imitation silk" were recognized. Today the uses of alcohol are so many that several pages are required to list them all.

Uses were so few in 1906 that only two formulas, C.D. No. 1 and C.D. No. 2, were authorized for sale.

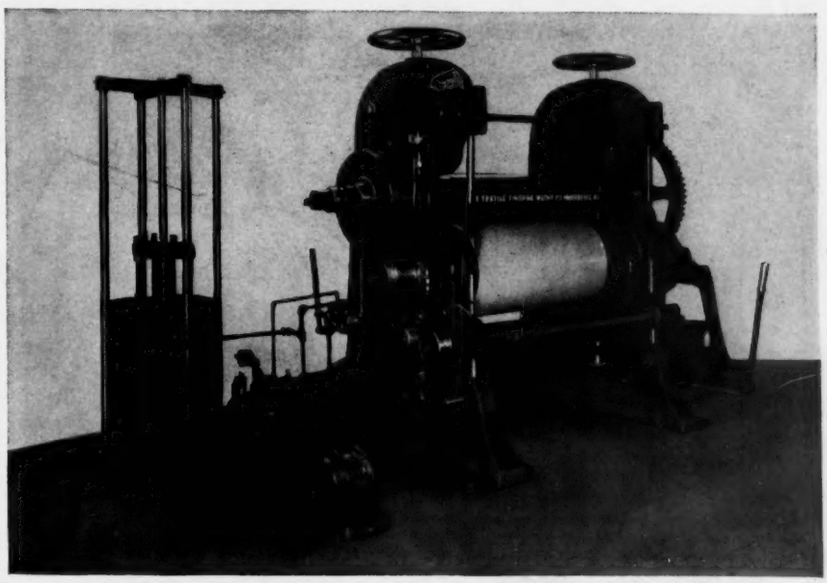


Photo Courtesy Textile-Finishing Machinery Co.

TEXTILES, after receiving the pyroxylin coat and drying, are passed through this two-roll hydraulic interchangeable embossing calendar.

ADVERTISEMENT—*This entire page is a paid advertisement.*

JUNE ★ **SOLVENT NEWS** ★ 1936

PAINTING ANODIZED ALUMINUM

Far greater adhesion of paints and lacquers on anodized aluminum sheets is obtained if the sheets are sprayed with a primer as soon as they have dried after leaving the anodizing bath. This has been the experience of the chief engineer for one of the aviation companies working with the problem.

The anodized aluminum has a porous surface, and if touched with greasy hands or if grease gets on the surface in any manner, it imbeds itself into the pores and is extremely difficult to remove. Ordinary cleaning will take it off the surface, but unless done very carefully, will not remove it from the pores.

Thus the immediate application of a priming coat serves to seal the pores and greatly improve the adhesion of the finishing coat, as it eliminates danger of "peeling" due to grease.

PYROXYLIN COATINGS

(Continued from preceding page)

than nine and three-quarters million yards of material were used in lining handbags alone in 1935 and an additional million yards used in novelty bags of various kinds.

Pyroxylin coating of textiles first assumed commercial importance as an industry about 15 years ago. The pyroxylin coating is, of course, a solution of nitrocellulose in a mixture of organic solvents. After evaporation of the solvents, the pyroxylin serves as a bonding or waterproofing agent. Such solutions are ordinarily known as dopes, cotton solutions, lacquers, etc.

To provide flexibility and elasticity, the addition of plasticizers or softeners is necessary. Other components are pigments, fillers, and gums. Castor oil was the first widely-used softener. It is not a true plasticizer, as it does not intimately dissolve in the solvent mix, but remains rather as a suspension. Later, diamyl and dibutyl phthalate and a host of others were introduced, but castor oil and the phthalates continue to be among the most widely used. Ordinarily, one to two parts of plasticizer to one part of nitrocellulose are employed, but if the film is pigmented, more plasticizer is needed. About three times the weight of the dry nitrocellulose is considered the upper limit, however, and any excess will tend to make the film tacky (or greasy if an excess of castor oil is employed).

Color pigments suitable for the film comprise a long list such as zinc oxide, zinc sulphide, lithopone, titanium dioxide, carbon blacks, lamp black, prussian and ultramarine blue, chrome yellows, and the various iron oxides. Lake colors are also employed to obtain brighter shades.

The textile manufacturer usually finds it to his advantage to mix his own solutions unless he uses small quantities in which case he may find it better to purchase solutions already prepared. By mixing his own solutions, a greater variety of combinations can be obtained from a smaller stock of materials. U.S.I. has been supplying both standard nitrocellulose solutions and the various solvents and plasticizers for a number of years.

INDUSTRIAL POTASH MADE FROM MOLASSES RESIDUES

U.S.I. contributes a portion of the industrial potash production of the U. S. A. by incinerating molasses residues which contain this valuable raw material. The crude potash so obtained is sold to fertilizer manufacturers as the most convenient and economical disposition.

Two types of potash are available: *I. C. Ash* is the ground clinker which comes out of the bottom of the incinerator. It is a coarse granular powder containing about 33% K_2O, present as sulphate, muriate, and carbonate of potash.

Sulphate Muriate: The intense heat of combustion vaporizes a portion of the potash salts. These are cooled and collected at the top of the incinerator by an elaborate system of bag filters. Testing about 54% K_2O, the product is mainly sulphate and muriate of potash.

A new house organ dealing with topics of interest to manufacturers, converters, buyers, and users of paper and paper products is being published by a large manufacturer of paper-testing instruments. Authoritative articles dealing with subjects of interest to those in the industry, will be featured.

TECHNICAL DEVELOPMENTS

The items in this column are gathered from many varied sources. Further information may be obtained by writing to U. S. I.

U S I

Rubber concrete, having properties of both concrete and rubber, can be made with a new product recently developed abroad. The qualities of rubber—flexibility, resilience, insulation and resistance to abrasion—can be obtained by suitable proportions of the mix. It is said that it is dustless and waterproof, and can be used for waterproofing roofs, pools, tanks, etc. The material also can be combined with the concrete used for tennis courts, roads, or floors.

U S I

Protection of ferrous metals from corrosion, heat and wear is said to be accomplished by a new process which involves driving silicon into the material. Castings, forgings or machined parts are rendered acid resistant and the surface is said to be so hard that it cannot be cut with a hacksaw.

U S I

A new waterproofing material in the form of a colorless, transparent liquid has been introduced. It can be used to treat wood, brick, concrete, etc. and will take a paint coat. A description states that it does not weather, crumble or crack. Application can be by spraying or brushing.

U S I

An elastic lacquer for application to rubber products has been placed on the market. The lacquer is water white and is said to show excellent adhesive qualities.

U S I

New types of automatic precision burettes for industrial laboratories have been developed abroad. They are said to provide great exactness and high titration speed. One type employs compressed air and another a vacuum.

U S I

A new metallic ink which will not off-set is being produced in England. Claims state that the ink fixes in a few hours and that overprinting in two colors can be done.

U S I

A sealing material suitable for lining gasoline tanks is now on the market. The inside of tanks can be sprayed with the compound and it is not affected by the gasoline. The material is a synthetic rubber and has been used to line the gasoline tanks of aeroplanes.

U S I

An acid resistant paint is now available. Application is said to result in a glossy surface which also resists action of boiling water, soaps and alkalis.

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Ethyl Ether
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Diethyl Carbonate
Estersols
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Ethyl Lactate

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Dibutyl Phthalate
Diethyl Phthalate
Dimethyl Phthalate

OTHER PRODUCTS
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Ethyl Acetoacetate
Ethyl Chlorcarbonate
Ethyl Oxalate
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Industrial Specialties

Use of Hypochlorite by Dry Cleaners

Dry cleaners can use sodium hypochlorite in the same way, and for the same purposes as the laundryman, when it is used on the same kinds of materials. It is the limitations of its use to white vegetable fibers such as cottons, linens—and with reasonable care also to rayons, and celanese—that have caused dry cleaners to hesitate to take even the advantages they might of its use. As the question states, chlorine is the laundryman's standby, but because of the large percentage of his work being with vegetable fabrics, it is only natural that he should make liberal use of it.

Nevertheless there are frequent occasions where a chlorine bleach, either as a spotting agent or bath bleach, would fit in admirably. As a bath bleaching process it is safe and effective for bleaching washable white lace curtains. It is equally safe and effective for clearing badly stained and water-marked ecru curtains to be retinted. It is also about the best method of clearing badly stained cotton wash suits, by bath treatment.

As a spotting agent, chlorine bleach is useful for removing a great variety of stains from any white cotton material; fruit stains, many inks (aniline inks particularly), color stains, some medicine stains, perfume, mildew, and many others. As a general thing, the type of materials and make-up of garments and the usually badly soiled condition in which they reach the dry cleaner require washing, and a badly stained condition is cleared up more easily by bath treatment. Roy Denny, *National Cleaner & Dyer*, April, p28.

A Model Paint Store

T. J. Maloney, Inc., N. Y. City advertising agency, has the Sherwin-Williams advertising account. To learn 1st-hand more about the dealer's problem of paint merchandising the agency went into the paint retail field last month with a store in New Rochelle, N. Y., a suburban center adjacent to N. Y. City.

Neuburger in New Field

Rudolf Neuburger, well-known in lacquer and leather cloth circles, resigns as Atlas Powder executive to become assistant to the president of United Wall Paper Factories.

Du Pont Suggests Peroxide as Laundry Bleach

Du Pont is sponsoring a new laundering procedure under the name of the "Albone" Process. It is an adaptation of practices that have been followed for years in textile finishing for production of more permanent white and clearer colors. As in textile processing, the use of Albone (du Pont hydrogen peroxide) is involved.

Merchandising Aid for Dry Cleaners

April issue of du Pont's house organ, *Modern Dry-Cleaner*, lists 3 complete selling campaigns now being offered to du Pont customers. Booklet, published by the Tri-Clene and Per-Clene Dept., contains numerous merchandising and advertising hints for dry-cleaners.

To Develop Detergent Specifications

An A. S. T. M. committee to develop standard soap and detergent specifications is being organized. H. P. Trevithick, chief chemist, N. Y. Produce Exchange, heads the organizing committee. Tentative plans indicate that work will begin on finished detergent products, with the possibility of expanding later to include specifications for detergent raw materials.

Glyco Products Introduces "Trigamine"

Replacing triethanolamine in most cases, a new emulsifying base, "Trigamine," has just been introduced by Glyco Products, 148 Lafayette st., N. Y. City. Trigamine is a liquid, almost water white in color with a pleasant odor. Trigamine is somewhat more viscous than triethanolamine and is completely soluble in water, glycols, glycerine and 50% alcohol. It is immiscible with organic solvents. It is non-hygroscopic at ordinary humidities and non-volatile up to 100°C. Trigamine forms soaps with the usual fatty acids such as stearic and oleic. Such soaps do not darken or yellow with age. Trigamine stearate, for example, is a hard white wax-like solid which remains white over a long period of time. Trigamine oleate is a liquid and not gelatinous. Emulsions made with trigamine stearate are white and stable and do not discolor even on long standing. Trigamine is less alkaline than triethanolamine, a 10% solution in water having a pH of 9.7. Trigamine can be used as a dispersing agent for casein and shellac in water replacing alkalies and giving a much more flexible film. Emulsions made with trigamine are of interest in textiles, paper, leather, cosmetics, agricultural sprays, polishes, and many other industries. Detailed booklet describing this product will be sent on request to the manufacturers.

Glycerine is finding many new uses in the specialty field. A thin solution of glycerine is suggested to brighten up the appearance of automobile tires. It will give them a new shiny look. A thin solution is suggested for use on door knobs and metal fixtures when painting is being done to protect the metal from paint spots. It wipes off easier than vaseline or other greases.

What the "well-dressed" retail paint store should look like. Story column one. Photograph, courtesy Tide.

Packaging, Handling and Shipping

¶Solving the Branch House Problem through the Use of Public Warehouses—

Branch offices have been established largely for the following reasons:

1. To overcome hand-to-mouth buying. Under this policy retailers refuse to carry stocks with the result that the manufacturer or the wholesaler must carry them, or at least have them placed so that they will be readily available to retailers. It is particularly important that producers, who wish to fully capitalize on their national advertising, have stocks readily available to retailers. National advertising is undertaken for the purpose of creating universal demand for certain products. The average purchaser of these products follows the line of least resistance and asks for them in local stores. Local merchants, in turn, would gladly stock small quantities of these products if they could be secured readily, with certainty, and without inconvenience. This can be satisfactorily brought about only by having stocks available in various sections of the country.

2. To place their goods in places where the business is thought to be. Many manufacturers feel that national distribution now means getting their goods as close as possible to the retailer before they are sold to him. Accessibility to markets ranks high as a factor leading to the establishment of branch houses. Coupled with this is the need for closer sales coverage, particularly in connection with any system whereby a manufacturer seeks to have his products handled only by selected distributors.

3. To combat competition and aid in keeping up the volume of business even though experience shows that few branches actually pay for themselves.

4. To take advantage of the difference between carload and less-than-carload freight rates. A large number of manufacturers now pay freight on their goods to destination. The difference between carload and less-than-carload freight rates has, therefore, led many to establish branch houses with stocks of goods to which carload shipments may be made, and from which small quantity deliveries by truck or rail, may then be made.

5. To improve service to customers. In order to better serve customers, manufacturers have been trying to achieve faster deliveries of their goods, better response to requests for repair parts, and a better all-round service to consumers and dealers. They feel that a branch house enables them to carry out this idea.

At present hundreds of concerns have the problem of continuing or discontinuing branch houses and offices, or modifying their distribution scheme so as to include the use of public warehouses in place of private warehouses or stock-carrying branches. Many manufacturers have recently discovered that the true cost of maintaining branch organizations has often been concealed, rather than revealed, by their accounting systems. For example, losses often occur at branch houses due to excessive inventories as well as from obsolescence of stocks. In fact, stocks at branch houses frequently impede factory turnover, which is just as important as retailer or wholesaler turnover. Maintenance of stock-carrying branch houses has also often led to the use of elaborate systems of accounting at the factory, in the traffic department, and in the sales divisions, which are a losing by-product of the branch house system. Moreover, branch houses have seldom been charged with an adequate percentage of home office executive salaries and expenses.

Despite these defects of the branch house system, the factors wliich lead to its adoption are still powerful. Manufacturers are, therefore, considering ways and means of achieving the same results at a lower cost. The first thing that many manufacturers have done is to reduce the personnel in their branches. This results in poor service to customers and generally makes the sales manager at the branch more of a clerk and warehouseman than a salesman.

A 2nd method has been to reduce the amount of stock carried, but this again reduces the service. A third alternative has been to shift from a branch house carrying a full stock to a combination sales office carrying no stock, but with a complete stock carried in a public warehouse in the same town. A 4th method has been to abandon branch sales offices entirely and to place stocks in public warehouses at various distribution centers under the accredited list system. Under this system a manufacturer supplies the warehouses with lists of customers in good credit standing and whose orders may be filled at the warehouse without 1st having to pass through the manufacturer's home office. When goods are delivered by the warehouseman the manufacturer is notified at once and then invoices the customer for what he has received.

A 5th method to cut down branch house overhead is by leasing a definite space, on a square foot basis, in a public warehouse, instead of renting or purchasing quarters elsewhere. This method differs from placing goods in the public warehouses to be carried in open storage for the account of the manufacturer. This type of storage is usually handled on a package basis. In paying for space rental in a public warehouse the charge covers only the net space used. Many square feet of space occupied by elevator shafts, stairways, hallways, etc., all of which are paid for in a privately rented building, are eliminated. In addition, the tenant in a public warehouse building obtains the advantages of all transportation and handling services offered by such organizations whenever required. The tenant also obtains the benefit of lower insurance rates on his merchandise when stored with a public warehouse.

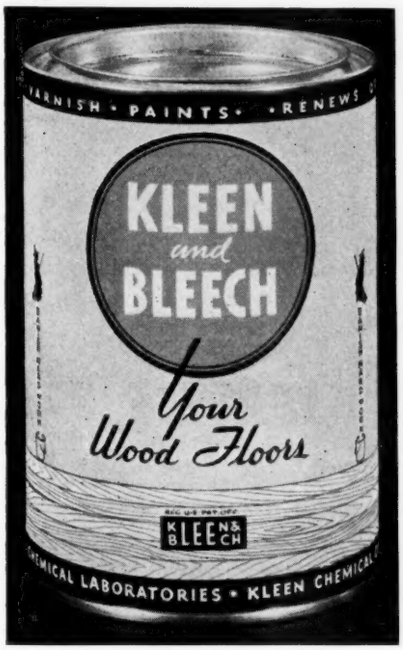
Inquiry among manufacturers reveals that many are today using public warehouses for their branch stocks, with or without branch sales offices, because public warehouses are lower in cost; because they offer a class of service which few manufacturers are in position to provide for themselves; because there is no need to enter into long-term leases or to purchase storage and branch house properties; because in public warehouses one may expand or contract the space used at will; and because no preliminary work is required in establishing branch stocks therein. Fifth article in a series "Why Manufacturers Use Public Warehouses," by Dr. John H. Frederick, appearing in *Shipping Management*, May, 1936, p26.

Carton Cutter

Shipping and receiving rooms and, in fact, wherever cartons must be opened, will find the Safeway Carton Cutter useful. Easily and conveniently opens all corrugated and fibre cartons. Can also be used for cutting corrugated paper and fibre board to special sizes.

New Products—
New Packages

Shu-White, a white shoe cleaner, put out by the Arthur W. Hahn Co., has just appeared in an attractive new display, designed and produced by Eastern States Carton Corp. In little more than lipstick size, Shu-White offers a white shoe cleaner with brush attached. The whole thing will fit conveniently into purse or pocket and robs the Summer problem of spotless white shoes of many of its previous terrors. Eastern States Carton Corp. has also just produced an attractive display for Nu-Stick, a dry shoe cleaner put out by the same company.



Kleen Chemical of Philadelphia has completely redesigned its container for "Kleen and Bleach," a product which finds wide, application in floor refinishing.

NEW
POLLY WADS
for Polishing
A quick, pleasant way to clean and polish METAL GLASS SILVERWARE
"I just rub it with a POLLYWAD and finish with a cloth"
IT RESTORES THE FACTORY FINISH
10 SHEETS for 10¢
ALWAYS CLEAN . . . Use it and throw it away!

Chemically treated paper sheets for polishing metal, glass and silverware, called Polly Wads, are being marketed from this attractive display container by Padco, Inc., N. Y. City.

The O'Brien Varnish Company, South Bend, Ind., has not only redesigned the containers for 2 of its popular products, Linoleum Lacquer and Linoleum Varnish, but is supplying dealers with this attractive merchandising display.

From A FULL LINE OF SILICATES

to a COMPLETE SILICATE SERVICE

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Degumming
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Kier Boiling
Laundering
Rayon Scouring
Silk Weighting
Vat Dyeing

IN THE PAPER INDUSTRY:
De-inking paper stock
Making spiral tubes
Corrugated paper board
Combined paper board
Sealing shipping containers
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Casein solvent for paper coating
Capping paper rolls
Sizing paper
Felt washing

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Clarifying dry cleaners' solvent
Cleaning oil bottles and drums
Cleaning oily concrete
Cleaning oily waste
Greaseproofing wooden containers
Oilproofing concrete
Preventing fat rancidity in soap
Reclaiming crank case oil
Sealing water-bearing strata in wells
Vegetable oil refining

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Chicago Sales Office: Engineering Bldg. Eight convenient plants.
Distributors in 60 cities. Sold in Canada by National Silicates Ltd., Toronto.

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P. Q. SILICATES OF SODA

New Trade Marks of the Month

355,184
ACTO

371,120

373,982
VIVO

361,790
OSMOSE

374,351
ANHYDRO — ASH

371,815

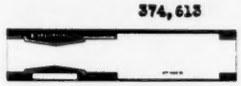
374,460

362,254
FUMOL

364,545
JOHNSON'S
Wax
FURNITURE
POLISH

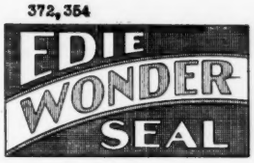
374,540
E-NAMEL-ON

372,173
SHOE-TEX

374,613


369,159

374,653
UNIVERSAL

372,354


374,657
EAGLE

369,910

374,666

372,894

373,542
COMPO-BOND

372,905
NORMALIZER

374,756
TRI-TIX

Trade Mark Descriptions†

355,184. Du Bois Soap Co., Cincinnati; filed Aug. 20, '34; for liquid soaps and oil soaps; use since Oct. '23.

361,790. Osmose Corp. of Am., Buffalo; filed Feb. 25, '35; for chemical wood preservative; use since Jan. 18, '35.

362,254. Fumol Corp., N. Y. City; filed Mar. 8, '35; for insecticides, germicides and disinfectants; use since Nov. '31.

364,545. S. C. Johnson & Son, Racine, Wis.; filed May 4, '35; for liquid wax polish; use since Feb. 20, '35.

369,159. Kerk Guild, Inc., Utica, N. Y.; filed Sept. 10, '35; for soaps; use since June 28, '35.

369,910. Cooperative G. L. F. Mills, Buffalo & Ithaca, N. Y.; filed Oct. 2, '35; for fertilizers; use since May 15, '35.

373,542. W. E. Smith (The Ceilcote Co.), Cleveland; filed Jan. 10, '36; for liquid and dry mortar; use since Oct. 10, '35.

371,120. Ruberoid Co., N. Y. City; filed Nov. 2, '35; for asbestos insulating papers and pipe coverings; use since Sept. '34.

371,815. Luis G. Hoyos (Carioca Mfg.), Philadelphia; filed Nov. 21, '35; for shoe polishes and dressings; use since Oct. 2, '35.

372,173. G. C. Hanford Mfg. Co., Syracuse, N. Y.; filed Dec. 2, '35; for shoe, leather and fabric dressing; use since Sept. 2, '35.

372,354. Victor Burdett Edie, Warren, Ohio; filed Dec. 7, '35; for compounds used to stop radiator leaks in automobiles; use since Oct. 1, '35.

372,894. Reich & Johnston, Tyler, Tex.; filed Dec. 20, '35; for glass, porcelain, metal, automobile, etc., cleaner; use since July 12, '35.

372,905. Calgon, Inc., Pittsburgh; filed Dec. 21, '35; for water treating composition preventing precipitation of calcium and magnesium salts and soaps; use since Jan. '35.

373,982. Vivo Chemical, Beaver Falls, Pa.; filed Jan. 22, '36; for cleanser; use since Sept. 12, '34.

374,351. Chrisman Supply Co., Fayetteville, N. Y.; filed Feb. 3, '36; for sodium carbonate-bicarbonate household cleaner; use since Apr. 28, '33.

374,460. Farmers' Cooperative Exchange, Raleigh, N. C.; filed Feb. 4, '36; for fertilizers; use since June '34.

374,540. Wipe-On Corp., N. Y. City; filed Feb. 5, '36; for paint enamels; use since Aug. 3, '35.

374,613. City Paint, St. Louis, Mo.; filed Feb. 8, '36; for paints, enamels, shellacs, etc.; use since Jan. 2, '36.

374,653. Certain-Teed Products, N. Y. City; filed Feb. 10, '36; for asphalt saturated and coated shingles; use since Oct. '26.

374,657. Eagle-Picher Lead, Cincinnati; filed Feb. 10, '36; for lead in various forms for common uses; use since Nov. 15, '26.

***374,666.** S. C. Johnson & Sons, Racine, Wis.; filed Feb. 10, '36; for wax as wood or metal polish, and lacquer; use since Jan. 21, '31, on wax, and July 10, '31, on lacquer.

† Trade-marks reproduced and described cover those appearing in the *U. S. Patent Gazettes*, Apr. 28 to May 26.

* From Apr. 21 *Patent Gazette.*

*Chemical Specialty Patents**

Synthetic tanning agent comprising a crystalline, water-soluble, glue-precipitating condensation product containing a sulfonic group and derived from a ketone and phenol, compound being in an acid medium. No. 2,038,529. Hermann Schuette and Richard Alles, Mannheim, Germany, to I.G., Frankfort-am-Main, Germany.

Chemicals for egg preservation comprising calcium carbonate as bonding medium, and using also a mild organic acid and a light mineral oil film. No. 2,038,540. Faw Yap Chuck, San Francisco.

Cleaning composition in powder form containing 60 to 73% spherulitized filled material, fine air-floated; 20 to 30% spherulitized filler material, 150 mesh; and 7 to 10% water-soluble saponaceous detergent. No. 2,038,653. Chester G. Gilbert, Washington, D. C., to Research Corp., N. Y. City.

Solid dehydrated lubricant for locomotive driving journals containing naphthenic petroleum grease and a sodium soap from animal fat and stearic acid saponified with caustic. No. 2,038,688. Gavin R. Taylor, Montreal West, Quebec, and Richard N. Smith, Toronto, Ontario, Canada, to McColl-Frontenac Oil Co. Ltd., Montreal, Quebec, Canada.

Solid dehydrated lubricant for locomotive driving journals containing 30 to 45% sodium soap; 3 to 15% calcium soap; 3 to 15% aluminum soap; less than 1% water; 1 to 5% glycerine; balance highly viscous naphthenic oil. No. 2,038,689. Gavin R. Taylor, Montreal West, Quebec, and Richard N. Smith, Toronto, Ontario, Canada, to McColl-Frontenac Oil Co. Ltd., Montreal, Quebec, Canada.

Printing ink containing 500 gms. dry pulverized pigment, 300 gms. pure linseed oil varnish, and 150 gms. water. No. 2,038,839. Karl Gross, Feuerbach, near Stuttgart, Germany.

Fertilizer composition containing air-dried peat and 7 to 12% by weight solid ammonium carbonate. No. 2,038,994. Oskar Flieg, Limburgerhof, Germany, to I.G., Frankfort-am-Main, Germany.

Veneering tape comprising a paper backing coated with a first layer of casein glue and rubber latex, and having 2nd adhesive layer of water soluble animal glue. No. 2,039,284. Robert N. Hartzell to Hartzell Industries, Inc., both of Piqua, Ohio.

Hard water soluble oil containing no alcohol comprising, in solution, about 8 to 40% purified mahogany soap, small amount water-soluble soap, and 0.5 to 2.5% water. No. 2,039,377. Elmer Wade Adams, Hammond, Ind., and George W. Flint, Chicago, to Standard Oil Co., Chicago.

Aqueous preparation which renders textiles fast to creasing, comprising an addition salt of an imidoether, addition salt of an amidine, and an aldehyde. No. 2,039,524. Alfred Eckemann and Ernst Koch, Frankfort-am-Main-Hochst, Germany, to General Aniline Works, Inc., N. Y. City.

Oil-proofing material comprising paper coated with film of water-soluble soap. No. 2,039,753. Benjamin H. Thurman, Bronxville, Arthur W. Thomas, N. Y. City, and Morris Mattikow, Brooklyn, N. Y., to Refining, Inc., Reno, Nev.

Adhesive paper having one surface treated with water soluble aniline dye, the other side being coated with animal glue. No. 2,039,803. Harold Kushel, Brooklyn, N. Y.

Transfer process which includes applying an oil-soluble color to the master sheet, moistening copy sheet with non-aqueous solvent. No. 2,040,075. Paul V. Brower, Maywood, Ill., to Ditto, Inc., a corp. of W. Va.

(Specialty Patents continued on next page.)

* Patents covered in this issue include those appearing in the *U. S. Patent Gazettes*, Apr. 28 to May 26.

Specialty Patents (Continued)

Production of drawings and designs for making printing plates. No. 2,040,170. William H. Eader, Denver, Colo.: one-third to Fred W. Bonfils and one-third to Albert De Bernardi, Jr., Denver, Colo.

Production stable bituminous emulsion for road surfacing comprising equal parts by weight of bituminous base and water. No. 2,040,208. Robert Joseph Lacau, Paris, France.

Shoe stiffening material comprising a porous fibrous foundation mixed with a finely divided cellulose ester and a synthetic resinous material. No. 2,040,320. Stanley P. Lovell, Newton, Mass., to Beckwith Mfg. Co., Dover, N. H.

Saturated asbestos sheet material for use as gasket and packing which contains asbestos millboard impregnated with mixture of drying oils, namely, China wood, linseed, turpentine, and metallic resinates. No. 2,040,348. John H. Victor, Wilmette, Benjamin J. Victor, Oak Park, and William A. Heinze, Chicago, Ill., to Victor Mfg. & Gasket Co., Chicago.

Chemical heating composition containing a mixture of finely divided iron, a metal electrolytically replaceable by iron, and acid forming electrolyte, and a salt; all of which will react with water to produce heat. No. 2,040,406. Raymond E. Reed to The Kendall Co., both of Chicago.

Chemical heating composition containing a finely divided metallic mixture and an electrolyte. No. 2,040,407. Raymond E. Reed, Oak Park, Ill., to The Kendall Co., Chicago.

Method of stabilizing soap containing an ionized metal by promoting catalytic oxidation of soap ingredients with zinc sulfide. No. 2,040,430. Ernest C. Crocker, Belmont, and Lloyd F. Henderson, Reading, Mass., to Arthur D. Little, Inc., Cambridge, Mass.

Bituminous paving composition comprising base of coarse particles which are coated with bituminous cementing material. No. 2,040,481. Richard M. Grower, Arlington, Mass., to Samuel J. Tomasello, Boston, Mass.

Preparation of emulsifying soaps by producing a soluble oil from so-called mahogany soap with dilute aqueous caustic. No. 2,040,673. Jack Robinson, Wood River, Ill., to Standard Oil Co., Chicago.

Fungicide and insecticide containing a copper zeolite. No. 2,040,811. Alexander A. Nikitin and Philip B. Myers, Newark, and James Fowler Adams, Wilmington, Del., to Walter C. O'Kane, Durham, N. H., and Paul Moore, Washington, D. C., trustees of Crop Protection Institute, Washington, D. C.

Process of drying tobacco for insecticidal purposes by dehydration and volatilization. No. 2,040,871. Robert Graham Mewborne, Albuquerque, N. Mex., to Niagara Sprayer & Chemical Co., Middleport, N. Y.

Ahesive material for sealing cellulistic materials which contains a nitrocellulose, a solvent plasticizer, castor oil, and a solvent. No. 2,040,916. Niels Holger Bjerg to A. B. Dick Co., both of Chicago.

Fireproof insulating materials containing not less than 15% trichlorbenzene and a polymerized styrene. No. 2,041,052. Harry C. Donaldson, Jr., Edgewood, and James G. Ford, Forest Hills, Pa., to Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Heat and sound insulating material by treating woody shavings with ammonium phosphate. No. 2,041,120. George H. Ellis, St. Paul, Minn., to The Insulite Co., Minneapolis, Minn.

Insectifuge, as a creamy material, containing an emulsion of a dialkylphthalate in water. No. 2,041,264. Walter Collins O'Kane, Durham, N. H.

Insecticide material comprising reaction product of an alkaloid toxic to insects, a dihydroxybenzene and an aldehyde. No. 2,041,298. Warren Moore, Richmond, Va., to Tobacco By-Products & Chemical Corp., Louisville, Ky.

Wood preservative comprising soluble dichromate, a soluble copper salt, a non-reducing salt of a weak volatile aliphatic acid, and a base material. No. 2,041,655. Gilbert Gunn, Pollokshaws, Scotland, to Celcure Corp. of Am., Worcester, Mass.

Textile specialty material comprising a substantially non-oxidized oil. No. 2,041,728. George Schnieder, Montclair, N. J., to Celanese Corp. of Am., a corp. of Del.

Pulverulent cleaning composition containing calcined diatomaceous earth, a powdered water-soluble soap, and a metallic salt detergent. No. 2,041,744. Arthur B. Cummins, Plainfield, N. J., to Johns-Manville Corp., N. Y. City.

Colored light sensitive material which includes a hydrazo compound in a silver halide gelatine emulsion layer. No. 2,041,827. Bela Gaspar, Brussels, Belgium.

Plastic packing composition containing shredded cork, graphite, high melting point grease, soda soap and high flash mineral oil. No. 2,041,835. Edgar G. Howland, Park Ridge, and Frank E. Payne, Glencoe, Ill., to Crane Packing Co., a corp. of Ill.

(*Specialty Patents concluded on next page.*)

374,827
DAPOL

374,828
METHICOL

374,882
AIREX

374,918
FULLEROL

374,919
PERCOLITE

375,048
DARSUN
King of Cleaners

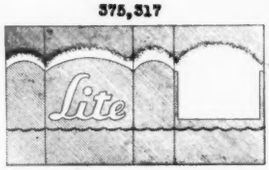
375,080
KOROSEAL

375,083
KOROGEL

375,179
MMM

375,283
HENURE

375,273
TROPICAL NIGHT

375,317


375,318
4S

375,407
UFORMITE

375,483
Wescote

375,504
POROFOS

375,505
POROFOS

375,516
Nacconol

375,517
Nacconol

375,524
FINECRAFT

375,527
WAY-CO

375,560
STAPEX

375,566
STABILITE

375,549
VIKE

375,567
VISCO

375,576
LIN-BAR

375,586
SYAN

Descriptions

374,756. Ralph S. Knapp (Viemme Laboratories), Evanston, Ill.; filed Feb. 12, '36; for adhesive paste; use since July '33.

374,827. Girdler Corp., Louisville, Ky.; filed Feb. 14, '36; for amino compounds such as 1,3-diaminopropanol-2; use since June 27, '34.

374,828. Girdler Corp.; filed Feb. 14, '36; for amino compounds such as 3-dimenthylaminopropanediol-1,2; use since Aug. 24, '34.

374,882. Dutch Airex Corp. of Am., Akron; filed Feb. 15, '36; for puncture sealing compound cans; use since Nov. 1, '35.

374,918. Walter S. Baylis, Huntington Park, Cal.; filed Feb. 17, '36; for activated Fuller's earth to treat lubricating oils; use since Feb. 4, '36.

374,919. Walter S. Baylis; filed Feb. 17, '36; for activated earth used to treat lubricating oils; use since Jan. 16, '36.

375,048. Gramercy Chemical Co., N. Y. City; filed Feb. 20, '36; for household water softener and cleaner; use since Mar. '35.

375,080. B. F. Goodrich Co., Akron; filed Feb. 21, '36; for plasticized polymerized vinyl chlorides; use since June 1, '34.

375,083. B. F. Goodrich Co.; filed Feb. 21, '36; for gelled solution of polymerized vinyl chloride; use since July 10, '35.

375,179. Southern Cement Co., Birmingham, Ala.; filed Feb. 24, '36; for hydraulic lime mortar; use since June '33.

375,283. Atkins & Durbrow, N. Y. City; filed Feb. 27, '36; for fertilizer and soil builder; use since Feb. 21, '36.

***375,273.** Shulton, Inc., N. Y. City; filed Feb. 26, '36; for toilet soaps; use since Feb. 18, '36.

375,317. Guy E. Brignall (Lite Soap Co.), Aurora, Ill.; filed Feb. 28, '36; for mineral soap and water-softener containing trisodium phosphate; use since Nov. 25, '35.

375,318. Brown Lindsay Paint, Chicago; filed Feb. 28, '36; for silk screen sensitizing solution; use since Apr. 7, '34.

375,407. Resinous Products & Chemical, Philadelphia; filed Feb. 29, '36; for urea-formaldehyde synthetic resins and their solutions; use since Feb. 24, '36.

375,483. Western Auto Supply, Kansas City, Mo.; filed Mar. 2, '36; for ready-mixed paints, enamels, varnishes and stains; use since July 1, '35.

375,504. General Chemical, N. Y. City; filed Mar. 3, '36; for detergents containing trisodium phosphate; use since Nov. 19, '35.

***375,505.** General Chemical, N. Y. City; filed Mar. 3, '36; for sodium phosphate; use since Nov. 19, '35.

375,516. National Aniline & Chemical; filed Mar. 3, '36; for detergent preparations; use since Oct. 5, '32.

375,517. National Aniline & Chemical; filed Mar. 3, '36; for chemical dyeing aids and textile assistants; use since Oct. 5, '32.

375,524. Morris Teplitsky (Finecraft Paint Products), Philadelphia; filed Mar. 3, '36; for paints, removers, polishes, and paint materials; use since Feb. 17, '36.

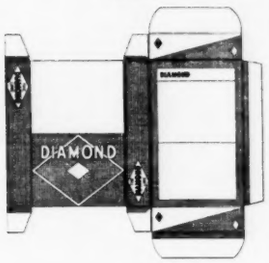
375,584
ZANTH

375,774
FRIVOLITÉS

375,775
LES ULTIMES FRIVOLITÉS

375,587
SYAN

375,822

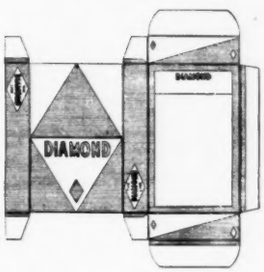


375,585
ZANTH

375,588
ACHLOR

375,589
ACHLOR

375,823

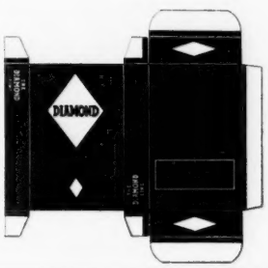


375,600
RICECALOID

375,616
ASDURA
ASPHALT PAINT

375,656
DRY-TEX

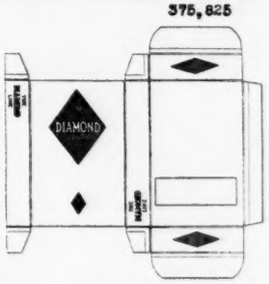
375,824



375,690
ACWALITE

375,759
GAMLENITE

375,825



375,833
OLD BLACK JOE

375,871
CICOIL

375,872
OITIOIL

375,930
PRE-T-SOFT

375,942
PARA MOUNT

375,950
HYDRHOPLEX

375,951
RHOFLAX

375,982
SENTINEL

Descriptions

375,527. Michael W. Wayne (Way-Co Co.), Baltimore, Md.; filed Mar. 3, '36; for non-poisonous alkaline antiseptic soluble powder; use since June '21.

375,560. A. E. Staley Mfg., Decatur, Ill.; filed Mar. 4, '36; for industrial starch products; use since Feb. 20, '36.

375,566. Visco Products, Houston, Tex.; filed Mar. 4, '36; for chemicals used to thin oil well drilling mud; use since Aug. 28, '30.

375,549. Keystone Lubricating Co., Philadelphia; filed Mar. 4, '36; for graphite plastic sealing compound; use since July 18, '34.

375,567. Visco Products; filed Mar. 4, '36; for chemicals used to break petroleum emulsions; use since Nov. 16, '31.

***375,576.** W. P. Fuller & Co., San Francisco; filed Mar. 5, '36; for varnishes; use since May 1, '33.

375,586. International Printing Ink; filed Mar. 5, '36; for oil and artists' colors, and pigments; use since Dec. 10, '35, on oil and artists' colors, Dec. 30, '35, on pigments.

375,584. International Printing Ink; filed Mar. 5, '36; for oil and artists' colors, and pigments; use since Dec. 10, '35, on oil and artists' colors and Dec. 30, '35, on pigments.

375,587. International Printing Ink; filed Mar. 5, '36; for printing ink and its pigments; use since Dec. 30, '35.

375,585. International Printing Ink; filed Mar. 5, '36; for printing ink and its pigments; use since Dec. 30, '35.

375,588. International Printing Ink; filed Mar. 5, '36; for oil and artists' colors, and pigments; use since Dec. 10, '35.

375,589. International Printing Ink; filed Mar. 5, '36; for printing ink and its pigments; use since Dec. 30, '35.

375,600. Cyrus Wm. Rice & Co., Pittsburgh; filed Mar. 5, '36; for boiler water conditioning materials; use since Jan. 13, '36.

375,616. Patek Bros., Inc., Milwaukee; filed Mar. 5, '36; for ready mixed paint; use since Oct. 7, '35.

375,656. Neva-Wet Corp. of Am., N. Y. City; filed Mar. 6, '36; for processing fluids to treat textiles, paper, etc.; use since Apr. 10, '33.

375,690. Celluloid Corp., Newark, N. J.; filed Mar. 7, '36; for formed plastic material; use since Mar. 2, '36.

375,759. Gamlen Chemical, San Francisco; filed Mar. 9, '36; for metal cleaner and preservative; use since July 14, '33.

375,774. Parfumerie Roger et Gallet, Societe Anonyme, Paris, France; filed Mar. 9, '36; for soaps; use since May 3, '34.

375,775. Parfumerie Roger & Gallet, Societe Anonyme; filed Mar. 9, '36; for soaps; use since Nov. 28, '35.

375,822. Wells & Richardson Co., Burlington, Vt.; filed Mar. 10, '36; for chemicals removing color from fabrics; use since Dec. 20, '35.

375,823. Wells & Richardson Co.; filed Mar. 10, '36; for bluing preparation; use since Dec. 20, '35.

375,824. Wells & Richardson Co.; filed Mar. 10, '36; for dyes; use since Dec. 20, '35.

375,825. Wells & Richardson Co.; filed Mar. 10, '36; for dyes; use since Dec. 20, '35.

375,833. Armour Fertilizer, Atlanta, Ga.; filed Mar. 11, '36; for fertilizer; use since Mar. 29, '27.

375,871. Brazil Oiticica S. A., Rio de Janeiro, Brazil; filed Mar. 12, '36; for paint oil; use since Nov. 27, '35.

375,872. Brasil Oiticica S. A., filed Mar. 12, '36; for paint oil; use since Nov. 27, '35.

375,930. Aaron Chaitkin (Bidwell Wholesale Grocery Co.), Pittsburgh; filed Mar. 13, '36; for water softener; use since Nov. 15, '35.

375,942. I. F. Laucks, Inc., Seattle, Wash.; filed Mar. 13, '36; for glue; use since Feb. 28, '36.

375,950. Rohm & Haas, Philadelphia; filed Mar 13, '36; for aqueous resin emulsion for textile use; use since May 27, '35

375,951. Rohm & Haas; filed Mar 13, '36; for textile coating material; use since May 3, '35.

375,982. Butler Bros. (Sentinel Labs.), Chicago; filed Mar. 14, '36; for insecticides and deodorants; use since Feb. 6, '36.

* Starred description on these pages are from the Apr. 21 *Patent Gazette.*

Specialty Patents (Concluded)

Oil pump diaphragm fabric impregnated with a drying oil. No. 2,041,836. James K. Hunt to E. I. du Pont de Nemours & Co., both of Wilmington, Del.

Method of decorating large surfaces by photography. No. 2,041,853. Eugene Mollo and Henry Charles Merrett, London, England.

Composition preventing sun-burn, containing menthyl salicylate. No. 2,041,874. Frits E. Stockelbach, Montclair, N. J.

Rubber cement containing rubber in organic solvents and a sulfonated hydrocarbon as activator. No. 2,042,063. Robert J. King and Elizabeth C. King to The Robert J. King Co., all of Stamford, Conn.

Heat insulation material containing bulk of basic magnesium carbonate, calcium carbonate, bentonite clay, diatomaceous earth, soft flexible asbestos mineral fiber as binder, and amphibole fiber. No. 2,042,096. Harold W. Greider, Plymouth Meeting, Pa., to The Philip Carey Mfg. Co., a corp. of Ohio.

Rubber coated cake of soap. No. 2,042,104. John P. Kane, N. Y. City.

Boiler cleaning composition consisting of henequen plant juice and a preservative of sodium benzoate, salicylic acid, borax or formaldehyde. No. 2,042,130. Edward Lewis Smead to Henex, S. A., both of Mexico, D. F., Mexico.

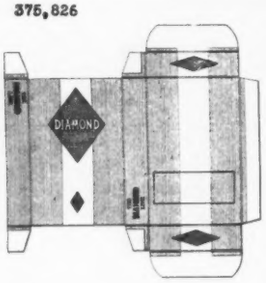
Insecticide preparation containing a non-volatile petroleum oil, a rotenone insecticide material, and an aryl alkyl ether. No. 2,042,296. Hyym E. Buc, Roselle, N. J., to Standard Oil Development Co., a corp. of Del.

Chemical cleaning process using aqueous alkaline solution and an alkaline detergent material, and an emulsifying agent. No. 2,042,347. Franklin H. MacKenzie, Bywood, Pa., to American Chemical Paint Co., Ambler, Pa.

Production of cube root, an insecticide material relatively new to the commercial field, has increased rapidly in recent years, particularly in Peru, where serious attention has been given to its exploitation. Peruvian exports in '35 aggregated 439 metric tons compared with 106 tons during the preceding year, 16 tons in '33, 8 tons in '32, and only 2 metric tons in '31. A detailed report relative to "The Culture and Exportation of Peruvian Cube" is available in the Commerce Department's Chemical Division, Washington.

Century Chemical Products, Detroit, was fined $300 and rebuked by the U. S. District Court on May 15th in an action under the Federal Insecticide Act. The Food and Drug Administration in comment on the action, says the company's product, known as "De-Germ," was offered as a disinfectant and germicide for use in theatres, hospitals, schools and other public places.

375,826



376,164

NOPAZ

371,109

376,325

OXO BORDEAUX

372,532

376,447

ANOXYL

375,952

RHONITE

376,476

SPICK

373,521

FROSTERILIZE

375,953

RHOPLEX

376,517

373,837

MOGUL

375,987

OMAR

373,729

376,000

VIKING

376,526

DRI-CHLOREZ

376,850

REZICOTE

374,840

MYCOVAPE

376,920

"HOME WITH THE SILVER LINING"

376,487

FOIL-BRITE

370,436

SOUTHERN

374,536

376,249

Transote

371,258

VISCOL

Handeewood

Descriptions

375,826. Wells & Richardson Co.; filed Mar. 10, '36; for dyes; use since Dec. 20, '35.

375,952. Rohm & Haas; filed Mar. 13, '36; for powdered synthetic resins and their solutions to be used as textile finishes; use since Apr. 12, '35.

375,953. Rohm & Haas; filed Mar. 13, '36; for resin solution to produce textile finishes; use since Apr. 11, '35.

375,987. T. H. Gibson (Tex Products Co.), Newark, N. J.; filed Mar. 14, '36; for paint materials; use since Dec. 21, '35.

376,000. Los Angeles Soap Co., Los Angeles; filed Mar. 14, '36; for dairy cleanser; use since Feb. 12, '36.

376,249. Reilly Tar & Chemical, Indianapolis; filed Mar. 21, '36; for insecticide and fungicide materials; use since Dec. 20, '35.

376,164. Atlas Powder, Wilmington, Del.; filed Mar. 19, '36; for lacquers, enamels, and materials; use since Feb. 26, '36.

376,325. Ansbacher Siegle Corp., Brooklyn; filed Mar. 24, '36; for agricultural insecticide and fungicide material; use since Mar. 26, '32.

376,447. Rohm & Haas, Philadelphia; filed Mar. 26, '36; for leather treating chemicals; use since Mar. 20, '36.

376,476. Knomark Mfg. Co.. Brooklyn; filed Mar. 27, '36; for shoe cleaner; use since Mar. 17, '25.

376,517. Phelan-Faust Paint Mfg., St. Louis, Mo.; filed Mar. 26, '36; for ready mixed interior enamel; use since Jan. 2, '36.

376,526. Chlorez Co., St. Louis, Mo.; filed Mar. 28, '36; for bleach, disinfectant, germicide and deodorant; filed Feb. 26, '36.

376,850. I. F. Laucks, Inc., Seattle; filed Apr. 6, '36; for cold water paints; use since Feb. 25, '36.

376,920. Reynolds Corp., N. Y. City; filed Apr. 7, '36; for aluminum paint; use since Mar. 5, '36.

370,436. Southern Alkali, Corpus Christi, Tex.; filed Oct. 16, '35; for soda ash and caustic soda; use since Sept. 26, '34.

371,258. A. K. Cohen, receiver for Adolph Sommer, deceased, Boston, to Stamford Rubber Supply Co., Stamford, Conn.; filed Nov. 6, '35; for leather and textile waterproofing oils and greases; use since 1888.

371,109. Orleans Drug Co., New Orleans, La.; filed Nov. 2, '35; for line of chemicals; use since Oct. 15, '35.

372,532. William K. Simmons, Port Orange, Fla.; filed Dec. 11, '35; for fertilizer; use since Oct. 20, '35.

373,521. Gordon G. Clark, Springfield, Mass.; filed Jan. 10, '36; for textile and leather moisture-proofing liquid; use since July 1, '34.

373,837. Peaslee-Gaulbert Corp., Louisville, Ky.; for asphalt composition roofing and building papers; use since Jan. 10, '10.

373,729. Hettrick Mfg., Toledo, Ohio; filed Jan. 16, '36; for waterproofing compound; use since June '31.

374,840. Masury-Young Co., Charlestown, Mass.; filed Feb. 14, '36; for insecticides; use since Jan. 1, '36.

376,487. Ohio Bronze Powder Co., Cleveland; filed Mar. 27, '36; for aluminum paste and powder as paint and pigment material; use since Jan. 15, '36.

374,536. Charles Sheblak, Los Angeles; filed Feb. 5, '36; for adhesive repair material; use since Jan. 5, '35.

Mineral Oil Uses

S. Schwabacher & Co., importer of mineral oils, has a limited number of reprints of an article, "A Thousand Little-Known Uses For Petroleum Products," which appeared in a recent number of the *National Petroleum News.*

New Location

Speed-O-Laq Products, varnishes and lacquers, opens a new plant in St. Paul, Minn. Company formerly carried on all operations in Minneapolis, but is now moving all previous manufacturing facilities to St. Paul and expanding production.

Macready Elected

Herbert V. Macready, of Magnus Chemical, Garwood, N. J., has been elected president of the newly formed Industrial Marketers of New Jersey. Logan D. Grupelli, National Oil Products, Harrison, is a vice-president.

Packaging Pays

Joseph L. Schwartz, general sales manager of Kleen Chemical, 235 W. Wyoming ave., Philadelphia, reports that adoption of new packaging about 6 weeks ago resulted in a record-breaking acceleration of business. (See Packaging Section, this issue.) Company is best known for "Kleen and Bleech," a powerful bleach and shellac and varnish remover. It also manufactures other products for cleaning drains and general household cleansing purposes.

Johnson Appeals

S. C. Johnson and Son, Inc., wax and paint manufacturers, Racine, Wis., whose suit charging trade mark infringement and unfair competition against the R. F. Johnston Paint Co., of Cincinnati, was dismissed by Judge Robert R. Nevin in the U. S. District Court at Cincinnati, was appealed to the U. S. Court of Appeals.

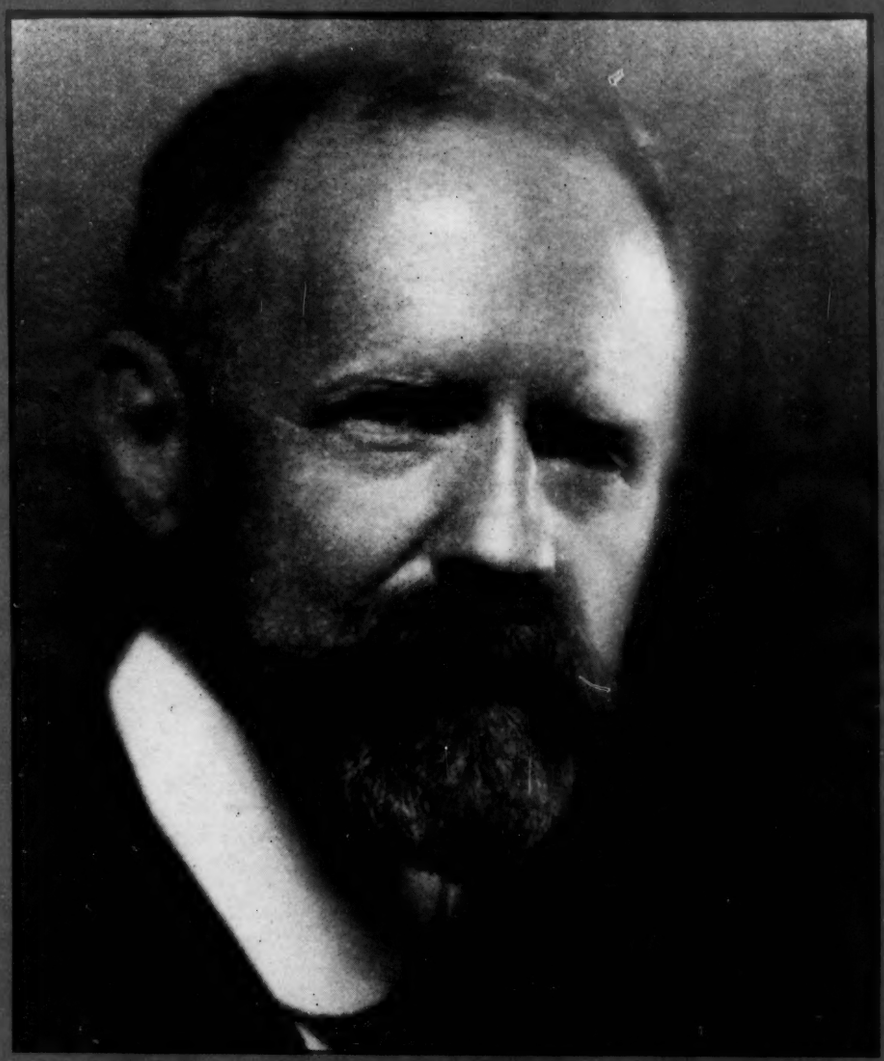
Free Gold Dust

To secure new users for Gold Dust Scouring Cleanser, Gold Dust Corp. recently canvassed Oklahoma City, leaving with each housewife a color-print sheet folder-type advertisement with coupon attached. The coupon is good for one can of Gold Dust Scouring Cleanser free with the purchase of one box of Silver Dust and 2 small packages of Gold Dust from one store.

Billion Paint Sales

Retail paint sales in the U. S. of one billion dollars annually is anticipated by 1940, according to *Digest of Trade Hints for Paint and Varnish Merchants* just issued by the Bureau of Foreign and Domestic Commerce in cooperation with the National Paint, Varnish and Lacquer Association.

CHEMICAL NEWS & MARKETS



William B. Bell, president, American Cyanamid, presides at annual M. C. A. meeting this month at Sea View Golf Club, Absecon, N. J.

BENZOLS, TOLUOL, XYLOL
in Tank Cars, Tank Wagons and Drums

Arcadian, the American Nitrate of Soda and Sulphate of Ammonia, Anhydrous Ammonia and Ammonia Liquor

BARRETAN*
BENZOL Pure, 90% and Motor
CHLOR META XYLENOL
CRESOLS U.S.P., Refined Ortho, Meta and Para; Special Fractions
CRESYLIC ACID Straw Color and Dark
CUMAR* Paracoumarone-indene Resin
FLOTATION OILS and REAGENTS
HI-FLASH NAPHTHA
HYDROCARBON OIL
NAPHTHALENE Crude, Refined Chipped, Flake, Ball and Nugget
PARA-CHLOR-META CRESOL
PHENOL (Natural) U.S.P. 39.5° M. Pt. and 40° M. Pt.; Technical 39° M. Pt.; Technical 82-84% and 90-92%
PICKLING INHIBITORS
PICOLINES
PYRIDINE Refined, Denaturing and Commercial
QUINOLINES
RUBBER SOFTENERS
SHINGLE STAIN OIL
SOLVENT NAPHTHA
SPECIAL HEAVY OIL
TAR ACID OILS
TOLUOL
XYLENOLS
XYLOL

* Reg. U. S. Pat. Off.

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FRENCH TARIFF PACT SIGNED

Import Rate Lowered on Several Chemicals — Monsanto Contracts for TVA Power — Wallace Pledges Chemurgic Movement Dept. of Agriculture's Support — Cyanamid in New Acquisitions—

The French Tariff Pact, signed May 6th, made public on May 13th, goes into effect June 15th. As in several of the previous trade pacts negotiated, rates on a number of chemicals are altered. Domestic perfume manufacturers are likely to benefit by reduced duties on essential oils from France, the new trade agreement indicates. Rate on all oils from France including clove, patchouli, sandalwood and all others not especially provided for has been lowered from 25% to 12½% ad valorem. Among the leading articles that are not affected are citrus oils, peppermint and eucalyptus.

A reduction in the duty of crude glycerine from 1c to 0.08c has been placed in effect through the signing of the agreement. France has for some years been one of the largest exporters of this product into this country. She has shipped as high as 4,000 tons annually, but current exports to the U. S. are said to be at a rate equal to but 2,000 to 3,000 tons due to the unsatisfactory state of the French soap industry.

The rate on vanilla beans has been reduced from 30c and 28% ad valorem to 15c and 14%. Since Madagascar, a French colony, is the largest supplier of beans to the U. S., such a reduction will be considered highly important to the flavoring extract manufacturing trade. What effect this will have on domestic vanillin producers is difficult to determine at this time.

The trade agreement with France discloses that this country has accorded the former reduced tariff rates on 3 important paint materials: ochers, orange mineral and cellulose acetate. France has been accorded a duty on this product of ¼c per lb. and 16% ad valorem, a reduction of 33% from the prevailing rate.

A reduction in the American duty on orange mineral to 2½c per lb. and 28% ad valorem, or 17% from the existing schedule has also been made.

France's concessions in paints and chemicals are represented by more favorable quota allotments to American exporters of butyl acetate, butyl alcohol, hydraulic lime, refined borax, sodium and potassium bichromates and chromates, and carborundum. Reductions also are being made in the French import tax rates on a number of items to 2%, from 6% and 4% as at present.

In the matter of butyl acetate, however, France has reserved the right to lower the quota minimum from the figures agreed upon in the treaty. American producers of the solvent have been accorded 300 quintals annually by France (quintal equals 220.4 lbs.), as against the present allotment of 232 quintals. The French government may lower the 300-quintal provision for the U. S. to a minimum of 254 quintals. The pact also limits the volume granted minimum rates on other products such as bichromates, paraffin wax and refined borax.

France has set a quota of 1,000 quintals for American varnishes and assimilated paints, not including those containing alcohol or cellulose acetate, as compared with the current importing rate of 1,878 quintals. With the import levy reduced, paint and varnish shipments to France are expected to remain well above the new quota minimum.*

* MCA at annual meeting June 4th, assailed reciprocal tariff trade pacts.

Monsanto's New Plant

Monsanto Chemical will take practically the entire power surplus from Muscle Shoals when it gets its new phosphoric acid plant in operation near Columbia, Tenn., according to newspaper reports. Company, the largest electric energy consumer in the South, will be the TVA's largest industrial customer.

PRESIDENT EDGAR M. QUEENY

His company will be TVA's largest industrial customer.

Company has already purchased several tracts of land in the vicinity of Columbia and has announced plans to establish a large chemical plant there. Plant will be located in what will become Monsanto, Tenn. Site for the town and plant is now agricultural land.

Recently, through a financing plan, the company secured an additional $6,000,000 for expansion purposes and the cost of the new Tennessee plant is expected to take a substantial percentage of this sum.

"A good thing" was the phrase applied to the construction of the Monsanto plant by David E. Lilienthal, TVA director. Although unwilling to comment and insisting that all information must come from the officials of the chemical concern, Mr. Lilienthal indicated in response to reporters' questions that the building of the plant and its use of TVA is a pleasing development from the viewpoint of the Authority. Large commercial users of TVA power, he indicated, are desired by the TVA and represent a forward step in its program.

Monsanto already has a large investment in this region through its purchase in '31 of Swann Chemical Company of Birmingham. Theodore Swann was the chief officer in the company, which operates large plants in Anniston, Ala., for the production of electro-ferro manganese and phosphoric acid of high grade. The plant, which passed into the Monsanto organization as a result of the deal, consumes electricity to the equivalent of 30,000 horsepower. As it is now understood, Monsanto plans to concentrate its phosphoric acid production at the new Tennessee plant, continuing to operate its Anniston plant for the production of ferro manganese.

New Financing

Monsanto's latest financing program for additional expansion was considered by *Time* editors of sufficient general interest to warrant nearly a column and a half of space in the May 18th issue. Reported *Time* in part:

"Among the smokestacks that make St. Louis sooty are those of the chemical industry. Biggest chemical concern in St. Louis, and one of the biggest in the U. S., is Monsanto, which operates one plant in St. Louis, another across the Mississippi in Illinois. Starting from scratch with the U. S. rights to a German patent on saccharin, Monsanto spent the 1st 20 years of its life shouldering its way to the top of the domestic fine chemical industry, the next 15 buying plants at home and abroad to consolidate a respectable position in the heavy chemical industry. For another $6,000,000 worth of expansion Monsanto last week prepared to offer its stockholders 101,310 shares of new stock at $60 a share. Underwritten by Edward B. Smith & Co., the offer will probably be snapped up, since even after a 19-point drop from its year's high, Monsanto stock is currently selling at 84.

". . . Monsanto has lost money in only three years since it was founded. The only deficit since 1904 was in the post-War depression. In 1929 earnings were $1,691,000. They fell off in 1930, have risen steadily since 1932 to last year's record of $3,843,000.

"Founder Queeny died in 1933, leaving Monsanto management to his son, Edgar

Monsanto Queeny, who had been president since 1927. Tall, dark, brisk President Queeny lives on a 500-acre farm in St. Louis County, rides horseback every morning before going to work. He boasts that "Monsanto's net contribution to . . . unemployment . . . was nil," since he never laid off a man during Depression, has twice as many people working for him now as in 1931. Satisfied, too, is Monsanto's Queeny that the firm's market is so diversified that no more than about 10% of Monsanto's gross profit comes from any one of the more than 300 chemicals it manufactures."

Wallace Writes Year Later

The Dept. of Agriculture will cooperate with the Farm Chemurgic Council in efforts to find new industrial uses for farm products, Secretary Henry A. Wallace said in a letter, made public May 25th, to Francis P. Garvan, president of the Council. Secretary Wallace's letter was in response to a letter from Mr. Garvan outlining a proposed "Plan for Coordinating Industry, Agriculture and Science."

Secretary Wallace said in his letter that the Department's present extensive work in this field is now being surveyed with a view to further expansion, and invited the Farm Chemurgic Council to recommend new research projects in addition to those which the Department is already carrying on. Secretary Wallace commended the Farm Chemurgic Council for its activities in this field.

In his letter, Mr. Wallace laid special emphasis upon the Dept. of Agriculture's concern that to be of significant assistance to agriculture any new industrial outlets that may be opened for farm products must be "at a price that will be profitable to the farmers."

"Economic statesmanship," Secretary Wallace said, "still is needed to solve the problems of agriculture."

New Consolidations

Formal announcement was made May 20th of the joint acquisition of Calumet Chemical's plant at Joliet, Ill., by American Cyanamid and Chemical and the Victor Chemical Works. The sodium aluminum sulfate manufacturing operations will be transferred to the local plant of Cyanamid, and the mono-calcium phosphate operations will be transferred to the West Nashville, Tenn., plant of Victor.

According to R. A. Asbury, Joliet superintendent of Cyanamid, the 3 firms involved in the transaction, including General Foods, parent company of Calumet Chemical, are planning to absorb the 85 Calumet workers who will lose their jobs with the cessation of operations at the plant.

American Cyanamid & Chemical has acquired Harrison Refining Co. of N. Y. City and Belleville, N. J., refiners of waxes and manufacturers of Iso-Beeswax, U. S. P. flaked white beeswax, and flaked ceresine.

Business will be conducted as the Harrison Refining Division of American Cyanamid & Chemical with the same personnel and the same high standards of production as heretofore. This makes available to the trade the advantages of the combined manufacturing resources, research and experience. All communications should be addressed to the Harrison Refining Division of American Cyanamid & Chemical at 350 Madison ave., N. Y. City, as in the past.

World Chemical Trade Expanded in 1935

International Survey Released—Our Exports Up 19% for First 6 Months—March Imports at Record Levels—Denmark Barters for Chilean Nitrate—

Each year now the Chemical Division, Bureau of Foreign & Domestic Commerce, publishes under the direction of the C. C. Concannon, chief of the division, a world-wide survey of the chemical industry. "World Chemical Developments in 1935," is now available from the Superintendent of Documents, Washington, at 15c per copy.

Preliminary figures indicate some expansion in the export trade of the major chemical-producing countries in 1935; but, chiefly because of reduction in prices of chemicals exported, total value of world exports will probably change little from the '34 figure of $1,063,411,000.

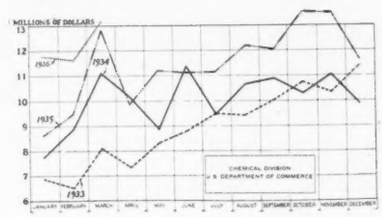
In this bulletin is included a table giving values of chemical imports and exports of 100 countries in 1934, the 1st time that such a detailed tabular presentation has been issued. This bulletin also differs from preceding ones by including, in addition to new material on Latin-American countries, considerable data on the African continent.

All major chemical-producing countries, with perhaps the exception of France, showed larger exports in 1935 than in 1934. In 1935 Germany maintained its position as the world's largest exporter of chemicals and allied products, surpassing its nearest competitors—the U. S., the United Kingdom, and France—by over $100,000,000. Of the important individual chemical exporters, however, Japan recorded the largest percentage increase in 1935, that of 10%, as compared with 1934, followed by the U. S. and Belgium with 9% each (results being based on the currencies of the individual countries).

Germany, with only a 2% expansion in values, probably showed the largest increase in volume. German chemical products had an advantage in many foreign markets because of governmental insistence upon the sale of chemicals in exchange for other products, sometimes at prices below the current market rates, in order to release frozen credits.

Exports Show Improvement

The foreign demand for American chemical products continued active during March, particularly for coal tar dyes, chemical specialties, paint products, fertilizers and sulfur. Total exports of such products were valued at $13,100,000 in March bringing the total for the 1st quarter to $36,591,000, an increase of approximately 19% over the 1st 3 months of '35, when chemical exports were valued at $30,850,000.



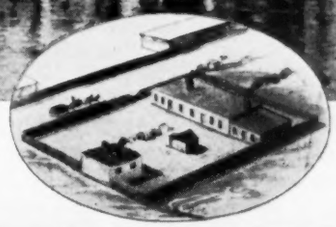
Trend in exports of chemical and allied products.

Export demand for American fertilizers of all types has been especially heavy since the beginning of the year, shipments during the 1st quarter totaling 493,164 tons, valued at $5,737,370, compared with 246,000 tons, valued at $2,344,562, in the 1st 3 months of '36. Largest increase was recorded in shipments of nitrogenous materials, quantity advancing from 23,695 to 101,900 tons and the value from $566,500 to $2,359,670. Shipments of phosphates also advanced sharply during the 1st quarter of the year to a total of 351,985 tons against 201,785 tons in the corresponding months of last year. Potash shipments increased from 14,715 to 30,100 tons.

Exports of coal tar products, particularly dyes, have advanced substantially, the total for the 1st quarter reaching the value of $3,786,600 compared with $3,382,850 for the corresponding period last year. In this group shipments of coal-tar colors, dyes, stains, etc., increased in quantity from 4,626,500 to 6,209,780 lbs. and the value advanced from $1,589,500 to $1,979,500.

American sulfur has staged a remarkable recovery in export markets since the beginning of the year. Shipments during the 1st quarter aggregated 128,545 tons, valued at $2,572,600 against 77,875 tons, valued at $1,544,000, during the 1st 3 months of last year.

Exports of industrial chemicals valued at $5,370,600 during the 1st quarter were



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Some few chemicals, mostly heavy chemicals, were being made in the east, but by far the greater part were imported from abroad. This country expanded industrially, and industry began to understand its dependence upon the chemist and his chemicals. Today there are produced in the United States more chemical products than the combined output of all of the countries of Europe with that of Russia and Japan added.

From its beginning Mallinckrodt Chemical Works has concentrated exclusively on the manufacture of fine chemicals, believing that by doing one thing only it could be done superlatively well. That this policy is a sound one is evidenced by the fact that today the Mallinckrodt line comprises over 2000 fine chemicals for medicinal, industrial, photographic and analytical purposes. This is the most complete line produced by any manufacturer and sold throughout the world wherever fine chemicals are required.

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slightly lower than for the same period last year but chemical specialties, a grouping which includes a long list of high-grade products, increased in value from $3,258,000 to $4,378,000.

More than 90 foreign countries purchased approximately one million gallons of American ready mixed paints, varnishes and lacquers during the 1st quarter, an increase of 10% over the corresponding period of '35, and an additional 190,000 gals. were shipped to our Territories and possessions.

Total value of paint product exports, exclusive of naval stores, aggregated $4,205,000 during the 1st quarter compared with $3,671,800 in the 1st 3 months of '35, preliminary statistics show. Exports of ready mixed paints at 526,350 gals. were about the same as in the 1st quarter of last year, but shipments of varnishes increased from 97,840 to 137,600 gals. and lacquers were up from 244,800 to 351,850 gals., statistics show.

Foreign demand for American paste and cold water paints is also increasing steadily. Exports of paste paints totalled 531,600 lbs. in the 1st quarter compared with 467,800 in the corresponding period of last year and shipments of kalsomine and cold water paints increased from 1,222,400 to 1,517,800 lbs.

Pigments, both mineral and chemical, increased substantially during the 1st quarter compared with the 1st 3 months of '35—former advancing from 6,141,000 to 8,520,000 lbs. and the latter from 37,151,800 to 40,277,000 lbs. In the latter classification carbon black shipments increased from 31 to 37 millions of lbs. and the invoice value increased from $1,426,300 to $1,690,000.

Exports of naval stores valued at $3,845,700 were about the same as for the 1st quarter of last year when the figure stood at $3,705,000, statistics show. Sales of rosin to foreign countries increased somewhat in quantity from 275,000 to 284,690 bbls. and the value rose from $2,316,000 to $2,453,000. Turpentine declined both in quantity and value—from 2,227,600 to 2,121,600 gals. and from $1,194,000 to $966,360.

Imports at Record Proportions

March imports of chemicals and related products continued at record levels due to heavy receipts of paint and varnish oils, waxes, medicinal oils, crude and semi-manufactured drugs, and fertilizer materials, according to C. C. Concannon, chief of the Commerce Department's Chemical Division. Receipts of most finished products including industrial explosives, soaps and toilet preparations, matches, potash, and coal-tar dyes, were lower.

Total invoice value aggregated $12,281,250, bringing the total for the 1st quarter to $39,745,600, an increase of approximately 21% over the corresponding period of '35, when imports of such products were recorded at $32,846,000. While a large part of this value increase was due to heavier volume, some of it has resulted from increased prices for certain raw materials, notably tung oil and carnauba wax.

Imports of fertilizer materials were valued at $11,035,000 in the 1st quarter compared with $9,373,000 for the corresponding period of last year, and the volume increased from 458,000 tons to 521,700 tons, preliminary statistics show. Increase was due to heavier receipts of nitrogenous materials, particularly Chilean nitrate, imports of which increased from 128,260 tons, to 187,500 tons. Potash receipts were lower, declining from 172,325 to 128,730 tons, reflecting increased production of this important fertilizer material in the U. S.

Paint Oils in Good Demand

Receipts of paint and varnish oils during the 1st quarter were more than double those for the 1st 3 months of '35, statistics show, but due to the higher place for tung oil, value advanced approximately 200%. Imports of tung oil increased from 26,491,000 lbs. during the 1st 3 months of '35 to 42,123,000 in the 1st quarter of the current period, and the price increased from $1,880,500 to $5,137,000. Receipts of perilla increased from 10,781,000 lbs. to 30,695,600.

Quantity of carnauba imported during the 1st quarter declined somewhat to 4,666,600 lbs. compared with 4,878,400 for the same period of '35, but the invoice cost increased from $1,083,000 to $1,612,400.

Other items on the chemical import list registering increases over the 1st quarter of last year included industrial chemicals, from $4,266,300 to $4,852,600.

Imports of natural dyeing and tanning materials were valued at $1,653,500 and were about the same as for the 1st quarter of '35, but receipts of coal-tar products declined in value from $3,689,000 to $3,160,500. In the latter group the decrease was due to smaller imports of coal-tar colors, dyes, and stains, the total of which amounted to 834,000 lbs., valued at $1,168,200, compared with 1,352,300, valued at $1,755,000, during the 1st quarter of last year. The U. S. now enjoys a favorable balance in its coal-tar dye foreign trade, exporting more than it imports.

Other items imported in smaller quantities during the 1st quarter, compared with the 1st 3 months of last year, included industrial explosives which declined in value from $135,000 to $46,300; soaps and toilet preparations from $802,600 to $612,750; paints, pigments and varnishes, from $488,680 to $434,900; essential oils, from $1,192,450 to $1,027,400.

COMING EVENTS

American Society of Mechanical Engineers, Dallas, Tex., June 17-20.

Pennsylvania Water Works Operators Association, Annual Conference, State College, Pa., June 22-24.

Chemical Engineering Congress, Central Hall, Westminster, England, June 23-27.

Pennsylvania Sewage Works Association, Annual Conference, State College, Pa., June 24-26.

American Pulp & Paper Mill Superintendents, Hotel Pantlind, Grand Rapids, Mich., June 24-26.

American Society for Testing Materials, Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J., June 29-July 3.

American Chemical Society, Semi-Annual Meeting, Pittsburgh, Sept. 7-12.

National Safety Council, 25th Annual Safety Congress, Atlantic City, N. J., Oct. 5-7.

Ohio Ceramic Industries Association, Annual Fall Meeting, Columbus, Ohio,, Oct. 9-10.

American Gas Association Convention, Atlantic City, N. J., week of Oct. 26.

American Association Textile Chemists and Colorists, Annual Meeting, Providence, R. I., Dec. 4, 5.

American Ceramic Society, Annual Meeting, Waldorf-Astoria, N. Y. City, week of Mar. 21, '37.

"Achema VIII," Plant exhibition, in connection with 50th General Meeting of Verein Deutscher Chemiker, Frankfurt, Germany, Sept., 1937.

LOCAL

June 16. Salesmen's Association of the American Chemical Industry, first golf tournament, Baltusrol, Short Hills, N. J.

June 25. N. Y. Chemists' Club, golf tournament, Rye Country Club.

June 26. N. Y. Section, American Association of Textile Chemists and Colorists, Annual Outing, North Jersey Country Club, Paterson, N. J.

Vessels for Nitrate

Danish and Chilean interests are negotiating a barter arrangement under the terms of which Denmark will construct 3 large merchant vessels for a Chilean shipping concern in exchange for nitrate, the amount involved being in the neighborhood of 11,000,000 crowns (approximately $2,400,000) according to a report from Minister Ruth Bryan Owen, made public by the Commerce Department's Chemical Division. The Danish Exchange Control Board is expected to approve the transaction. Denmark normally imports around 38,000 tons of Chilean nitrate, valued at 6,000,000 crowns ($1,300,000) annually, the report states.

Italy's New Plants

Recent Italian Ministerial decrees authorized the erection of new plants in Italy for the production of acetylene, fatty alcohols, benzyl chloride, grape and tomato seed oils, and several other chemical products. Six companies were authorized to extend their production capacity for carbon disulfide and one company was allowed to increase its output of sulfate cellulose and ground wood pulp. Applications for new plants to produce industrial alcohol from beets and molasses, methyl chloride and galalith were refused.

South African Cyanide

The North American Cyanamid, Ltd., of Toronto, has now purchased 40½ acres of ground at Witbank, Transvaal, South Africa, for the erection of a branch factory, with cyanide as the chief product. N. W. Buch, director and vice-president of the North American Cyanamid, Ltd., was a recent visitor to the Union of South Africa.

Toch Heads American Institute of Chemists

Bogert Honored at Annual Meeting—Zinsser Elected President Chemists' Club (N. Y.) — Day Chosen Marburg Lecturer—Other Association News—

American Institute of Chemists held their annual meeting in Buffalo, last month. Prominent speakers included Frank G. Breyer who discussed unemployment among experienced chemists; Dr. Max Trumper, "The Chemical Frontiers"; Maurice C. Taylor, "The Industrial Research Chemists' Balance Sheet"; and Dr. W. J. Cotton, "Opportunities for Service by the Institute." Annual presentation of the Institute's medal for outstanding service went to Dr. Marston Taylor Bogert who addressed the group on recent synthetic organic chemical development. Between meetings and papers, the members visited a number of plants in the important Niagara Falls district.

New American Institute of Chemists officers and councilors for next year will be headed by Dr. Maximilian Toch, of Toch Bros., N. Y. City. New vice-president is Dr. Robert J. Moore, Bakelite development manager; treasurer is Burke H. Knight of Knight & Clarke, N. Y. City. Howard S. Neiman, N. Y. City patent attorney, continues as secretary, and councilors for the year include Frank G. Breyer, Dr. Neil E. Gordon, and Dr. Allen Rogers.

N. Y. Chemists Select

N. Y. Chemists Club selects Dr. F. G. Zinsser as president for the coming year. Newly elected vice-presidents include Prof. Arthur W. Hixson, Dr. Victor G. Bloede and Dr. R. J. Moore. Robert T. Baldwin is the secretary, S. J White is treasurer, and Dr. L W. Bass and C. W. Fairbank are now trustees for 3 year terms.

A. S. T. M.'s Annual Meeting

Dr. Arthur L. Day, director, Geophysical Laboratory, Carnegie Institution of Washington, will deliver the 11th Edgar Marburg Lecture at the 1936 A. S. T. M. Annual Meeting at Chalfonte-Haddon Hall, Atlantic City, June 29-July 3, inclusive. The lecture is scheduled for 4 o'clock, Wednesday afternoon.

This lecture which is delivered at the A. S. T. M. annual meeting each year commemorates the name of the Society's 1st secretary-treasurer, who, through his development of technical programs over a period of 16 years, brought wide recognition to the Society as a forum for the discussion of engineering materials subjects.

Doctor Day, who has taken a leading part in the glass industry, plans in his lecture to follow through a number of important developments of recent years from their early beginnings and discuss in detail not only the application of modern glasses, but also the mechanical development of processing machinery.

N. F. A. Honored

National Fertilizer Association receives honorable mention in the award competition for higher standards of individual and association performance, sponsored annually by the American Trade Association Executives.

Association Notes

The Philadelphia Drug Exchange members played the St. David's Golf Club course at Wayne, Pa., on June 3rd.

Chemical Club of Philadelphia held its annual spring golf outing at the Llanerch Country Club, last month. Dinner and entertainment followed the tournament.

The Philadelphia paint trade will "golf and near golf" at Turners Country Club, Eddington, on June 17th. George B. Heckel, 220 S. 16th st., is booking reservations.

The plastic and molding industry went to Shawnee, Delaware Water Gap, on May 25th for a day of golf. Bakelite's Gordon Brown again acted as master of ceremonies.

Dr. Richard Feibelmann, developer of "Aktivin" and technical director of the company with the same name discussed "Hydrosulfite and Vat" at the May meeting of the N. Y. Section of the American Association of Textile Chemists & Colorists. First outing of the group will be held at the North Jersey Country Club, Paterson, N. J., on June 26th. Henry F. Herrmann is in charge.

Giauque Receives Chandler Medal

Roger Adams, Former ACS President, is the '36 Gibbs Medallist—Cereal Chemists Meet at Dallas—Personal News Items—

The Charles Frederick Chandler Medal of Columbia University was presented May 28th to Prof. William Francis Giauque of the University of California, discoverer of a method of magnetic cooling by which temperatures approaching absolute zero can be obtained. Dr. George B. Pegram, Acting Dean of the Graduate Faculties of the University, conferred the medal upon Prof. Giauque at a national gathering of scientists in Havemeyer Hall, N. Y. City. Prof. Giauque, who is said to have made the world's most systematic study of very low temperatures and entropy measurements, delivered the medal address on "The Production and Use of Temperatures Below One Degree Absolute."

Chicago Section's Award

Roger Adams, head of the department of chemistry of the University of Illinois and past A. C. S. president, received the '36 Willard Gibbs Medal of the Society's Chicago Section at a dinner at the Stevens, May 23rd, celebrating the 25th anniversary of the founding of the award by William A. Converse.

Blish Receives Osborne Medal

The American Association of Cereal Chemists awarded the Thomas Burr Osborne Medal to Dr. Morris Joslin Blish, presenting it to him on the occasion of the annual meeting of the association at Dallas, Texas, on June 2nd. This was the 3rd award of the medal, the 1st recipient being Dr. T. B. Osborne, after whom the medal was named, while the 2nd recipient was Dr. C. H. Bailey of the University of Minnesota. Dr. Blish is professor of Agricultural Chemistry in the University of Nebraska and head of the chemistry department in the Nebraska Agricultural Experiment Station.

Dr. Nieuwland Honored

The Rev. Julius Arthur Nieuwland, C. S. C., Notre Dame University's noted scientist, received the Mendel Medal for 1936 at Villanova College on May 12th.

Heard and Overheard

Herbert L. Carpenter, president of Carpenter Container, at a dinner held in his honor May 25th, was appointed by Mayor LaGuardia as chairman of a committee to eliminate useless Brooklyn elevated lines. Mr. Carpenter long has been associated with the unification program of the N. Y. City administration.

Theodore R. Donlan, chief chemist of the solvents development laboratories of Standard Alcohol, spoke on May 12 before the Baskerville Association of C. C. N. Y. on the subject of "Commercial Petroleum Solvents." Henry G. Moore, chief chemist of the Duralac Chemical Corp., Newark, N. J., acted as guest chairman.

Dr. Walter S. Landis, Cyanamid vice-president, was the speaker at the 1st session of the newly formed Western Connecticut A. C. S. Section at a meeting held in Stamford, Conn., on May 15th. Dr. Charles R. Downs, well-known N. Y. City consultant, a past president of the N. Y. Section, is president of the newly formed group. Several of the executives of Cyanamid attended the meeting.

Cyanamid is centralizing its research work at the former Verran plant at Stamford. Air Reduction's research division is also located near Stamford.

Hercules Powder's Men's Club heard Seth Gordon, of the Pennsylvania Board of Game Commissioners, in an address on restoration of wild life, at the Hotel DuPont, last month.

Harry L. Noyes, Union Carbide chief engineer at Niagara Falls, receives honorary degree of Doctor of Laws at Niagara University's commencement exercises.

Official delegates of the U. S. Government to the Chemical Engineering Congress in London are Martin H. Ittner, A. I. Ch. E. president, and John V. N. Dorr, well-known metallurgical engineer.

By invitation of the directors, Roy H. Kienle of Calco's research laboratory delivered the opening address at the dedication of Britain's new Color, Paint & Varnish Association research station.

Elizabeth Stroud, editor of the *Hercules Mixer* since '32, won the $1,000 award of the Walker Engraving Corp. for her "ad" "Just a Pair of Wooden Shoes."

Ray Schlotterer, as chairman of the drug and chemical division of Citizens Family Welfare Committee, N. Y. City, believes the committee will have no trouble in raising a minimum of $1,500,000.

Wallace H. Carothers, du Pont, noted for his research on synthetic rubber, has been elected to membership in The National Academy of Sciences, Washington. Dr. Carothers is the first industrial organic chemist to have won this honor.

Staff of the J. T. Baker Chemical plant, at Easton, Pa., gave a testimonial dinner to R. H. Shimer who left Easton to take charge of Baker's new plant in Maine.

Dow Chemical buys land and buildings of Union Motor & Truck Co. at Midland. Property comprises 24 acres and several large buildings.

Adrian D. Joyce, Glidden president, with his family, returned from Europe aboard the *Europa* last month.

A. G. Watt, of A. G. Watt Co., paint raw materials, Cleveland, was a passenger on the new German zeppelin *Hindenburg* on its first return trip to Germany, last month.

Portraits

Portrait of Ernest T. Trigg, N. P. V. L. A. president, was presented to the Association by E. V. Peters, at the annual convention in Washington.

Portrait of the late Dr. David Wesson was presented to The N. Y. Chemists Club by Calco's August Merz, early last month.

New Chemical Producer Announced

Alex C. Fergusson will Act as Distributer for New Company—Grasselli Exhibits at Great Lakes Exposition—New Recovered Sulfur Manufacturer—Armour to Make Fluosilicate—

Alex C. Fergusson Co., Philadelphia, announces that it will be sole distributor for the recently organized Fort Washington Chemical Co. of Philadelphia and Fort Washington, Pa. New company will produce litharge and sodium nitrate and their derivatives, including arsenate of lead. Property and assets of the Chemical Products Co. have been acquired, and greatly increased equipment is being installed at the Fort Washington plant, operations being scheduled to start about June 1st. Griscom Bettle is the new firm's president and Robert M. Cole, who holds the patents for the processes being used by the company, is v-p. and chemical director. Directors include Messrs. Bettle, Cole, George Clothier, Dr. John S. Eynon, Alex C. Fergusson, Jr., W. D. Mason, and Nicholas C. Roosevelt. H. C. Henshaw is the secretary.

Complete Exhibit of Products

Chemicals used in wood preservation, in industry, and in agriculture, along with a complete miniature metal finishing plant, will comprise Grasselli Chemical's exhibit at the Great Lakes Exposition which opens in Cleveland, Ohio, June 27th, and continues until Oct. 4th. Exposition commemorates the 100th anniversary of the founding of Cleveland and will be open one hundred days. Grasselli exhibit will be located in the Lakeside Exposition Hall.

Sulfur for Insecticides

Establishment of a sulfur recovery plant with a daily capacity of 6 tons of high grade sulfur for use as an insecticide and fungicide was announced recently by officials of Portland Gas & Coke of Portland, Ore.

This latest addition to the company's list of by-products has been placed on the market under the trade name of "Microsulfur." It is expected to be of value in helping to control orchard and garden pests.

About 10,000 tons of sulfur are on hand at the company's plant, enough to keep the recovery plant operating at capacity for 5 years. This represents a number of years' accumulation of discarded gas purifying materials.

To Make Fluosilicate

Installation of a plant for the production of sodium fluosilicate, used largely as a base for insecticides and also used by laundries, at the Armour fertilizer works at Navassa, N. C., was announced June 1st by D. T. Bowden, division manager. The plant was completed only 2 weeks ago at an approximate cost of $25,000.

Purchase by Glidden Co. of Certain-Teed's paint division will result in shutdown of the latter company's Buffalo plant. Equipment and inventories will be sent to Glidden plants in Cleveland and Reading.

Devoe and Raynolds Paint, Louisville, Ky., will feature in their advertising the newly developed method of processing oils for house paints which was developed by Dr. J. S. Long.

Chemists and engineers of Arthur D. Little, Inc., Cambridge, Mass., will work with Dr. G. C. North, Beatrice Creamery, Chicago, in investigating new products and processes for ice cream and milk industries.

Evidence of increasing industrial activity is reflected in du Pont's announcement of a 10% increase in salaries of all employees, effective immediately. Company has recommended similar action to its subsidiaries.

Solvay Process pays $100,000 in cash for option on properties of Louisiana Lime Products at Winnfield, La. Solvay is taking ore samples to determine extent of available limestone and will pay close to $550,000 for the property if samples prove satisfactory, according to local reports.

Wallace & Tiernan Co., Belleville, N. J., manufacturer of water and sewage purifying systems, plans to build a plant in Nutley, N. J.

Gray Processes Corp. has filed a bill in the U. S. District Court of Eastern Texas alleging infringement by East Texas Refinery of 10 clay treating patents.

Plans for the expansion of the plant and warehouse of the Ecclestone Chemical Co. in Detroit have been announced.

Industrial Oil Products, Los Angeles subsidiary of Murray Oil Products, installs new hydrogenating plant in that city.

Taylor Chemical, Aberdeen, N. C., lost entire plant including stock piles of sulfur, $30,000, May 12, by fire.

From the Plants

Officials of the du Pont organization, including President Lammot du Pont, W. F. Harrington, a vice-president, and F. A. Wardenburg, general manager of the ammonia division, inspected the Belle, W. Va., plant on May 22nd and were guests at a dinner afterwards at the Daniel Boone Hotel in Charleston. Dr. J. L. E. Cheetham, manager of the Belle plant, and

C. H. Doherty, Jr., assistant manager, were the hosts.

After Gov. H. G. Kump of West Virginia had delivered a "wide one" to Mayor D. Boone Dawson at the opening of the Charleston Industrial Baseball League on May 15th, the du Pont team proceeded to show Carbide what real competition is like before a record crowd of 2,000. Final score was 8 to 4 with the game called at the end of the 5th inning.

Michigan Chemical, new St. Louis, Mich., producer of bromine and bromides, starts operations with initial daily salt capacity of about 40 tons.

Explosion of a 164,000 gal. alcohol tank at Publicker's Philadelphia plant injured 3 men, early last month. Steel structure of plant prevented outbreak of fire.

Belle Alkali, Belle, W. Va., resumes operations after a 3 weeks shut-down for plant reorganization.

Several of the chemical plants at Niagara Falls are represented in an industrial tennis league, including Niacet and Oldbury.

At New Addresses

Commercial Solvents moves its Philadelphia warehouse from 701 S. Front st. to larger quarters in the Terminal Commerce Bldg., 401 N. Broad st. E. T. Butler is in charge.

Egyptian Lacquer Mfg., N. Y. City, moves from 90 West st. to offices in the R. K. O. Bldg., Rockefeller Center.

Chain Belt Co., Milwaukee, manufacturer of conveyor equipment, moves its Pittsburgh office to Rm. 526, Grant Bldg. G. E. Mahoney, formerly with the company at Milwaukee, has been transferred to the new office.

Construction

C. W. Haynes Laboratories, Springfield, Mass., begins construction of a lacquer plant which will contain floor space of 10,000 sq. ft.

Burkart-Schier Chemical, Chattanooga, will spend $24,500 on a new one-story brick plant.

Union Carbide's $20,000,000 construction program for '36 includes a $1,000,000 expenditure on plants in the Niagara Falls area. Plants sharing in the improvement plans include Carbide & Carbon, National Carbon and Acheson Graphite, according to Harry L. Noyes, chief engineer.

Potash Co. of America starts erection of new warehouse at Carlsbad, N. M., which will bring company's storage capacity to 40,000 tons.

A chemical and metallurgical testing and control laboratory is part of Ford Motor's $37,000,000 expansion program. Laboratory is already in service at the Rouge plant, analyzing metals, textiles, oils and rubbers now in use in the factory. Staff of 65 technicians keeps the laboratory going 24 hours a day checking all raw materials used at the plant.

Monsanto's new division, The Rubber Service Laboratories, is enlarging office facilities in Akron.

Consolidated Feldspar, Baltimore, Md., is planning expenditure of $100,000 for a crushing and treating plant in that city.

Michigan Alkali, Wyandotte, installs 2 Schaffer poidometers and 2 Kritzer hydrators in the plant.

Republic Steel may build a tar and chemical plant in Cleveland to utilize by-products, according to local reports.

Wyodak Chemical begins construction of a new bentonite drying plant at Upton, Wyo. Power will be furnished by Diesel installation.

The Alexandria, Va., City Council last month granted permission to American Chlorophyll, Inc., to construct a plant on the property of the old Virginia-Carolina Chemical Co.

Industrial Minerals Corp. of America, which operates large vermiculite ore properties in North Carolina and the Southwest, is planning construction of a $100,000 processing plant at Buffalo, N. Y., early this fall, according to R. E. Lowther, president.

Harshaw Chemical is planning to add to its Newburg ave. plant in Cleveland.

Plans are being made by U. S. I. for the improvement and re-equipping of its Curtis Bay plants.

Heavy Demand for Industrial Chemicals

All Consuming Lines Busy with the Exception of Textiles and Tanning — Hercules Lowers Ethyl Cellulose Prices — Good Demand for Agricultural Insecticides—

Consumption of industrial chemicals in May was but slightly under the total for April which was decidedly the best month to date. And in some instances, particularly in the N. Y Metropolitan area, suppliers reported May tonnages ahead of April, largely due to improved conditions in the Paterson and Passaic textile centers. However, near the close of the 30-day period a more conservative purchasing tone became evident with the approach of the summer season. It is difficult to determine yet whether or not the usual "summer dullness" will prevail, or whether industry generally will hold to or close to the current pace over the 3rd quarter. There are several factors present which would tend to indicate the latter course, among which may be mentioned the soldiers' bonus, the late start this year in seasonal industrial improvement caused by the severe winter and floods, and the greatly improved state of business. On the other hand, the political angle will become increasingly important in the next 30 days with the national conventions over and the candidates picked.

Practically every branch of industry participated in the gains. The automotive industry continued to set the pace with a production of over 400,000 units, a very small decline from the April figure. The paint and lacquer trades were extremely busy as a result of the boom in building and the activity in the automotive centers. The paper manufacturers reported production at satisfactory levels and the glass industry is shipping out large quantities of finished products. Conditions in the textile field are still somewhat mixed, quiet in certain centers and in certain branches and fairly active in others. Tanning operations are relatively slow and below the rate for the same period of last year.

Rubber consumption last month is thought to have exceeded the all-time high of almost 52,000 tons established in April. Total for the 2 months would thus run about 105,000 tons, substantially greater than the consumption for any other 2 months' period on record. Highest month's use of rubber during the boom years of '28 and '29 was only 48,982 tons. Largest previous to April was 50,700 tons in June, '33. Larger rubber content of present automobile tires compared to those of the late 20's accounts largely for the increased consumption of crude.

Prices generally remained stable during the past month. Tin salts were low-

Important Price Changes

ADVANCED

	May 29	Apr. 30
Cobalt sulfate	$0.51	$0.46

DECLINED

Sodium stannate	$0.31	$0.32
Tin crystals	.35	.36
Tin tetrachloride	.23½	.23¾

DEPT. OF LABOR STATISTICS

	Apr.'36	Mar.'36	Apr.'35
Employment *a*	109.0	*z*108.1	106.9
Payrolls *a*	104.9	*z*103.0	96.2

DATA FOR PROCESS INDUSTRIES

	Apr.'36	Mar.'36	Apr.'35
Explosives:			
Employment *a*	85.3	89.4	84.6
Payrolls *a*	77.7	86.0	69.3
Soap:			
Employment *a*	96.8	96.4	102.7
Payrolls *a*	93.6	95.0	97.0

	Mar. '36	Mar. '35
Exports	$1,897,000	$2,081,000
Imports	1,718,000	1,749,000
Crude sulfur, exports	557,000	579,000
Indus. Chemical Specialties, exports	1,605,000	1,525,000

a 1923-1925 = 100.0; *z* Revised.

ered again. The meeting of the International Tin Committee was postponed from late in May to the latter part of June. This action was taken, it is said, to enable Bolivia to move out part at least of the 7,000 tons which she had under-produced during the past year. It is expected that at the June meeting the export quotas for the 3rd quarter will be increased from the 85% rate now prevailing.

Hercules Powder has announced that the enlarged ethyl cellulose plant has been completed, and that it is now in position to supply increased quantities of this material.

Also, in line with its policy of reducing the selling price as soon as volume warrants, the following reduced price schedule, f.o.b. Wilmington, is effective immediately:

	Per lb.
1 lb. to 99 lbs.	$1.50
100 lbs. to 299 lbs.	1.45
300 lbs. to 500 lbs.	1.42
Under contract, yearly consumption of 2,000 lbs.	1.40
Under contract, yearly consumption of 5,000 lbs.	1.35

Manufacturers of the standard agricultural insecticides report an excellent demand with the price structure firm. Pyrethrum prices, on the other hand, are weak. Competition among the suppliers is particularly keen this season.

Methanol Production

Production figures on crude and synthetic methanol, released by the Bureau of Census, reveal an increase in synthetic methanol production for the 1st quarter of '36 over both '35 and '34 figures, but show a slight decrease in production of crude as compared with '35. Production in gallons for 1st quarter of '36 stood at 1,461,292 for crude and 4,590,866 for synthetic methanol, as compared with 1,161,584 for crude and 3,733,200 for synthetic in '35 and 1,066,007 for crude and 2,587,519 for synthetic in '34.

Personnel

George C. Betz, well known in ceramic trades, is now on sales staff of Foote Mineral, Philadelphia.

Robert G. Quinn, formerly with Cyanamid and later in the research division of International Paper, is now on the research staff of Johns-Manville at Manville, N. J.

Francis X. Ferney, formerly chief chemist for Southern Mineral Products, has recently become connected with the Bird Machine Works, with headquarters at South Walpole, Mass.

W. J. Porter, who was with Commonwealth Southern and then with Warner Chemical, is now with the Tennessee Corp., with Atlanta headquarters.

Vernon Bishop, Ch. E. '33 University of Michigan, has resigned his position as research chemist at the Bridgeville Plant of American Cyanamid & Chemical, and is now associated with his father, Howard B. Bishop, president of Sterling Products, Easton, Pa.

Stanley A. Knisely is now director of advertising for Republic Steel. Forrest H. Ramage is new sales promotion manager and Chester W. Ruth is assistant advertising director.

L. B. Coppernoll Co., Oswego, N. Y., will represent American District Steam, N. Tonawanda, manufacturers of steam distribution equipment, in the Syracuse, Oswego territory.

Dr. Ulric B. Bray is now assistant manager of research for Union Oil, San Francisco. Donald E. Carr succeeds Dr. Bray as research supervisor.

C. E. Sims, formerly metallurgist for Bureau of Mines and American Steel Foundries, is now research metallurgist at Battelle Memorial Institute, Columbus, Ohio.

A. B. Miller, formerly with Paraffin Cos. of San Francisco, is now in the Development Dept. of Hercules Experimental Station, Wilmington.

Du Pont transfers Edward F. Maloney from the Du Pont Finishes Division at Chicago to Everett, Mass., where he will have charge of sales.

Thomas W. Davies, formerly in charge of ammonia products sales for Barrett Co., is now with Potash Co. of America, with sales offices at Augusta, Ga.

Harry F. Klocker, formerly assistant general freight agent for M-K-T railroad, is now Monsanto's assistant traffic manager at St. Louis.

Diamond Alkali elects John T. Richards as vice-president and director.

Daniel McCrudden, Jr., is now on the sales force of D. H. Litter Co., paint and varnish producer, covering the Philadelphia district.

Recent additions to the research staff of Ansul Chemical, refrigerant and insecticide materials, Marinette, Wisc., include Walter O. Walker, formerly on the Dept. of Chemistry faculty at Miami University (Fla.), and Philip J. Ehman, formerly on Continental Can's research staff. Mr. Walker will take charge of all Ansul research.

C. W. Rippie resigns Shell Petroleum to join Solvay Process' technical service dept., Syracuse.

John T. Stearn, former Mellon Institute fellow, is now with United Gas Improvement, Philadelphia.

Theodore M. Switz, formerly with Barrett, is now technical director for Pulp Products, Massillon, Ohio.

Samuel Aronoff is now secretary in charge of production and research for Crown Oil Products, Long Island City, N. Y., after 8 years with Spencer Kellogg & Sons.

E. B. Auerbach leaves the Ira J. Owen Organization to open his own consulting offices in Chicago.

W. S. Gilfoil, former chemistry and engineering professor at Loyola Univ., La., is now with Louisiana Oil Refining, Shreveport, in charge of the laboratory and compounding plant.

Charles F. Gurnham is now on Naugatuck Chemical's staff. He was formerly with Ludlow Mfg. & Sales.

Reuben G. Henrich leaves Universal Atlas Cement, Buffington, Ind., to become chief chemist for Surpass Leather, Gloversville, N. Y.

Robert H. Coerdt, formerly with Ansbacher-Siegle, is now with Beck-Koller in Cleveland, Ohio.

C. G. McQuaide, formerly in Publicker Commercial Alcohol's Chicago office, is now vice-president and general sales manager, with offices in Philadelphia.

Obituaries

Frank C. Thornton, one of the pioneers in the drum manufacturing industry in this country and president of the F. C. Thornton Co., Cleveland, died May 7th.

Edward J. Doyle, 74, Union Carbide & Carbon employee for many years, at Niagara Falls.

Mrs. Charles L. Parsons, wife of the A. C. S. secretary and business manager, after a brief illness, on Apr. 29. Mrs. Parsons, who accompanied her husband on many of his business and pleasure trips, had made many friends in the chemical industry, both here and abroad.

Joseph Bancroft, 60, former president of Joseph Bancroft & Sons, bleaching, dyeing and finishing, in Wilmington, May 6.

Edmund Key, 85, president of Marshall Cotton Oil Co., Marshall, Ala., on May 4.

Arthur R. Murphy, 37, in charge of Azo Colors division, du Pont, at Deepwater, N. J., following a short illness, May 12.

Clarence G. Bull, 54, director and vice-president of Sherwin-Williams, at his home, Cleveland Heights, May 8. Mr. Bull had been with the company since '02 when he started as a clerk in the purchasing department.

Col. Beverly Wyly Dunn, 75, inventor of "Dunnite" explosive and influential in the formulation of safety regulations for explosive transportation, in N. Y. City, May 10.

George William Sargent, 63, former president and chairman of the board of Molybdenum Corp., at his home in Hollidaysburg, Pa., May 10.

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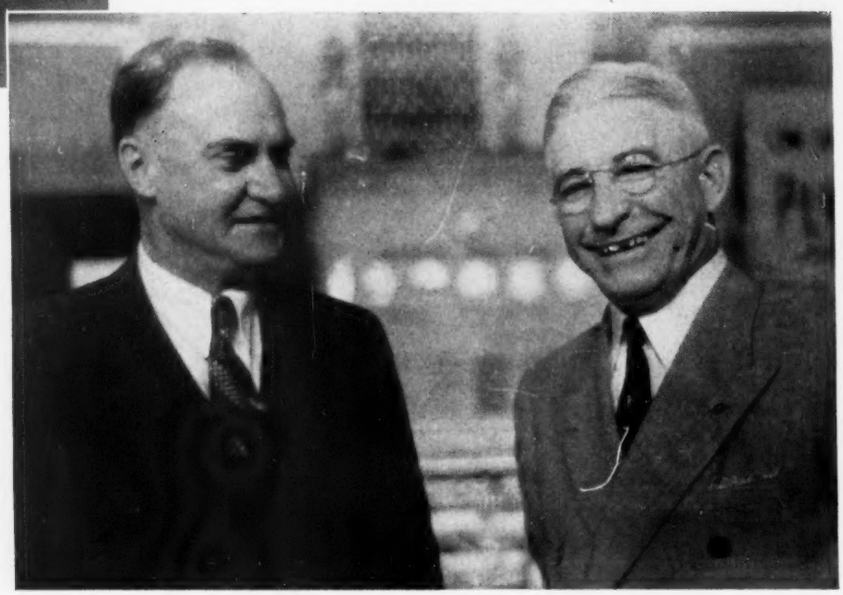

At the Farm Chemurgic Council. Upper corner, Professor A.W. Hixson, of Columbia, and A. Cressy Morrison. Above, Carl B. Fritsche, Managing Director of the Council, and Louis J. Taber, Master of the National Grange. Left, Enoch Perkins, Mutual Chemical's Yankee manager of their South Sea Island chrome mines. Right, the industry's Number One container expert, M. F. Crass of Grasselli, who moves to Wilmington shortly to take charge of all du Pont bulk container problems.

Cyanamid executives, headed by Warner D. Huntington (New York), G. E. Cox (Niagara Falls), S. R. Frost (Toronto), and A. O. Williams (Niagara Falls), were hosts to the delegation of German superphosphate manufacturers who toured extensively in this country last month. Photograph was taken in front of the plant offices of the North American Cyanamid, Ltd., Niagara Falls, Canada.

NEWS REEL

of Our Chemical Activities

Mrs. Gladys W. Crane, Philadelphia Quartz

Dorothy Grossman of Monsanto

Above, Miss Ann Elise Beckin
Victor Chemical

Right:
Miss Lenore K. McCafferty
Hercules Powder

Left, Miss Dorothie Bethel
Grasselli Chemical

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NATIONAL QUALITY

Naphthalene and Cresylic Shortages Continue

Refined Naphthalene Supplies Difficult to Obtain—Coal Tar Solvents Prices Renewed—Coke Production at Higher Levels

Basic conditions in the coal tar chemical field remained unaltered during the past month. Demand for nearly all items was extremely heavy. The shortages of crude naphthalene and cresylic acid were still the outstanding features of the market. With the season for shipping refined naphthalene in full swing, producers and repackers were experiencing difficulties in making deliveries. March imports of naphthalene totaled 3,672,198 lbs., valued at $66,264. Of the total imports, Belgium shipped 156,322 lbs.; Czechoslovakia, 440,920; Germany, 222,633; Netherlands, 615,681; Russia, 1,211,846; United Kingdom, 888,516, and Canada, 136,280 lbs. With the shortage of naphthalene world-wide, the outlook for any immediate improvement in the volume of supply appears remote. Consumers are genuinely concerned over the prospect of operating for some time with greatly reduced tonnages of crude.

Cresylic was advanced again last month and quotations on this chemical have now reached the stage where they are strictly nominal. The synthetic resin industry has been increasing its requirements of cresylic acid rapidly with the result that supplies are difficult to obtain.

Continued high rate of activity in the automobile centers is reflected in the available stocks of toluol, xylol and solvent naphtha. Despite heavy consumption, producers have renewed contracts on benzol, toluol, xylol and solvent naphtha for the last half of the year.

Important Price Changes

ADVANCED

	May 29	Apr. 30
Acid Cresylic	$0.63	$0.58

DECLINED

None.

6 Year Record in Coke

Coke production increased substantially in April, to the highest level since that of October, '30. Daily output of 118,939 tons, from byproduct and beehive ovens, was 8.8% above that of March and 29.9% above April a year ago. Production of byproduct coke for the 30 days of April amounted to 3,466,417 tons, or 115,547 tons per day. Compared with March, the daily rate advanced 10.0%. Increased activity at blast furnaces resulted in a gain of 21.7% in the daily production of pig iron. Responding to this activity, coke production at furnace plants rose 14.0%, while at merchant plants the gain amounted to 1.0%.

Output of beehive coke, on the other hand, declined from 109,300 tons in March to 88,200 tons in April. Decrease in daily production amounted to 19.3%.

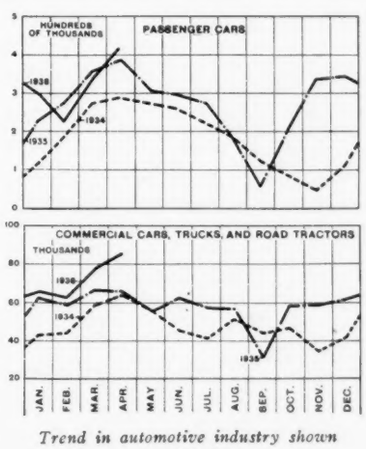
Stocks of byproduct coke at furnace plants declined 10.4% during the month and were the lowest since the beginning of the record in '28. Stocks at merchant plants, which had been reduced to unusually low levels by the active demand for domestic coke during the winter, showed the normal seasonal increase.

Benzol production was 8,543,000 gals. as compared with 7,782,000 in March and 5,807,000 in April last year. Total to the end of April was 31,453,000 gals. as compared with 24,629,000 in the same period a year ago. Ammonia sulfate, or its equivalent, was 55,212 tons as against 51,614 tons in March, and 40,942 tons in April a year ago. Total to the end of April was 208,980 tons as against 170,803 tons in the similar period a year ago. Tar yield was 46,035,432 gals. in April; 43,224,936 in March, and 35,607,625 in April last year. Total for the end of April was 174,885,568 gals. as against 149,068,599 in the similar period a year ago. Light oil output was 14,479,691 gals. in April; 13,595,695 in March and 11,208,483 in April, 1935. Total to the end of April was 55,007,391 as compared with 46,883,931 gals. in the same period of '35.

Keen Competition in Solvents Markets

Acetone is Reduced ½c—Shipments to Lacquer and Rubber Manufacturers in Good Volume — Alcohol Price Structure Weak—

The competitive situation in certain items in the solvents field became worse instead of better last month and acetone was reduced a ½c. Butyl alcohol, butyl acetate and ethyl acetate prices were said to be fairly firm at the recently set levels. These conditions are said to be the direct result of competition between makers rather than because of a poor demand from consumers. With automotive production still around the 100,000 units per week level, the consumption of lacquer chemicals has been very satisfactory from the tonnage viewpoint and the outlook for the next 60 days is very encouraging.



Trend in automotive industry shown graphically.

Earlier estimates of 400,000 automobile units in May proved low by about 100,000. According to present production schedules June production will run about 450,000 units, which would compare very favorably with the 377,000 produced in June last year. While June retail sales may drop slightly from the May peak, manufacturers will continue manufacturing operations at a high pitch, anticipating increased demand with the payment of the soldiers' bonus. Also manufacturers are likely to keep dealers' stocks at a high point for several striking changes are planned for the '37 models which may cause some delay. The producers may bring out the new models at an even earlier date than was the case last year.

Important Price Changes

ADVANCED

	May 29	Apr. 30
None.		

DECLINED

Acetone, tks.	$0.08	$0.08½
Drs.	.09	.09½
Alcohol, isobutyl	.08½	.10½

DEPT. OF LABOR STATISTICS

	Apr.'36	Mar.'36	Apr.'35
Petroleum Refining:			
Employment *a*	109.6	*z*107.5	108.3
Payrolls *a*	101.3	*z*103.0	96.9

	Mar. '36	Mar. '35
Petroleum & Products:		
Exports	$19,452,000	$20,250,000
Imports	2,751,000	4,397,000

a 1923-25 = 100.0; *z* Revised.

The call for petroleum solvents was good last month. Shipments into the Akron rubber center were particularly large. A seasonal increase in the demand for Stoddard Solvent was reported. The price structure continued without any major change. A slight upward revision was made on the tankwagon and drum quotations for petroleum thinner in the Baltimore area.

There is little to report on the alcohol situation. The price structure still remains weak and the demand at the moment is only of modest proportions. There is quite a little speculation in the trade on the possibility of lower quotations for the 3rd quarter.

Reports from 24 operating plants have led the Bureau of Internal Revenue to

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estimate that 11,948,243 proof gals. of industrial alcohol were produced during April. Tax-paid withdrawals of industrial alcohol were said to approximate 2,440,765 proof gals. Stocks in 67 reporting warehouses at the end of the month were listed as 21,224,206 proof gals.

Report also revealed that 32 denaturing plants produced 5,464,188 wine gals. of specially denatured alcohol. These plants removed 5,508,371 wine gals., leaving stocks of 502,315 wine gals. at the end of the month. During the month the plants produced 489,252 wine gals. of completely denatured alcohol, removed 392,591 and reported final stocks of 1,274,874.

Acetylsalicylic Reduced

Several Other Important Price Declines Announced Last Month—

Total volume of shipments of fine chemicals and pharmaceuticals declined rather sharply from the March and April figures. Much of the loss could, of course, be laid to the decline in winter seasonal items, while, on the other hand, the warmer weather products were still in but quiet demand. Photographic chemicals and specialties, however, moved into consuming channels in large quantities.

Important Price Changes

ADVANCED

	May 29	Apr. 30
None.		

DECLINED

Acetylsalicylic acid	$0.58	$0.70
Ammonium bromide	.35	.39
Benzyl benzoate	.90	.95
Ethyl methyl ketone:		
Tks.	.06½	.07½
Drs.	.07½	.08½
Iodine tincture	1.90	2.10
Mannitol	1.60	1.70
Mercury	75.50	77.00
Methyl anthranilate	2.10	2.15
Potassium bromide	.31	.35
Sodium bromide	.31	.35

DEPT. OF LABOR STATISTICS

	Apr.'36	Mar.'36	Apr.'35
Employment, Druggist's preparations *a*	98.4	99.0	98.9
Payrolls, Druggist's preparations *a*	98.0	100.0	97.7

a 1923-1925 = 100.0.

The sharp reduction in crude iodine, made at the beginning of May, brought about a general price rearrangement on a number of the salts. Development of a competitive situation was held responsible for the lowering of the quotations on ammonium, potassium and sodium bromides. Competition was also held responsible for the 12c reduction in acetylsalicylic acid, the 1st quotation change in this item since November, '32. Glycerine prices were particularly firm at the higher levels reached on May 1st. While the import rate on glycerine from France has been lowered through the signing of the French tariff pact, the trade is of the opinion that for the time being such action will have no effect on the price structure. It is of more than passing interest that mannitol has been reduced 10c per lb. at this time.

Mercury prices were somewhat less firm last month but this had no effect on the market for mercurials. Bismuth salts were firm in price and in good demand. In the last 10 days of the month consumers were said to be ordering out substantial quantities of tartaric and citric.

Paint Raw Materials Markets Resume Activity

Paint Manufacturing Operations at Seasonally High Levels—Speculation on Chrome Yellow Prices for 3rd Quarter—Building Activity Expands—

In the last 2 weeks of April the paint raw materials market went into a mild tailspin for some mysterious reason or reasons which were never satisfactorily explained. Most factors in the trade simply interpreted the slump as a case of temporary "jitters." In the last half of May there were a number of indications that recovery was again on the way. Paint manufacturers have consistently maintained heavy production schedules during the past 60 or 90 days so that the supply of raw materials in their plants must be at a low point.

The trade is speculating about chrome yellow prices for the 3rd quarter. The current level is considerably below what is felt to be profitable prices, and there appears to be some let-up in the highly competitive conditions, but whether or not a rise can be successfully placed in effect at this time is a matter over which there is considerable divergence of opinion.

Another topic of conversation is the possible trend in French ochers. The import rate will be lowered on June 15th, but, as yet, local factors have failed to indicate whether quotations will be revamped. Contracts on lithopone and titanium pigments are being solicited at unchanged prices. The delay in offering contracts on zinc oxide for the last half of the year has caused rumors to circulate that some increase might be made. Oxide prices were slashed last October but whether producers will attempt to regain part of the ground lost then is quite problematical.

A rise in Spanish red oxide prices, the 1st change of any sort in this item in months, was said to be the result of higher import prices asked of the importers. A ⅛c to 1c advance was reported in American golden yellow ocher and a ⅛c advance on the Pacific Coast was noted for both Persian Gulf red oxide and Turkey brown umber.

Manufacturers anticipate a substantial improvement in paint sales during the coming weeks. Sales have not kept pace with the upturn in new construction since the turn of the year, February volume actually falling below the '35 record.

Demand for paints usually lags behind an increase in construction contract awards, it is pointed out. Furthermore, unfavorable weather in the first quarter of the year delayed the painting season considerably. Since February manufacturers have increased their gains over the 1935 showing in each month. Volume now exceeds that of last year by 15 to 20%, and sales over the coming months should widen such gains further.

Important Price Changes

ADVANCED

	May 29	Apr. 30
Spanish red oxide	all grades	¼c

DECLINED

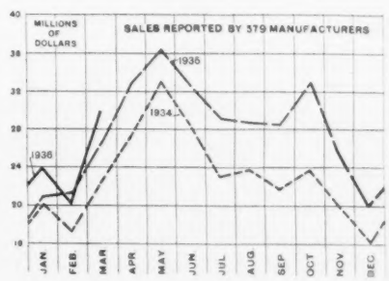
Yellow ocher, American golden	$0.06¼	$0.06½

DEPT. OF LABOR STATISTICS

	Apr.'36	Mar.'36	Apr.'35
Employment *a*	111.9	*z*108.1	109.2
Payrolls *a*	100.3	95.9	91.9

	Mar. '36	Mar. '35
Pigments, Paints and Varnish, exports	$1,543,000	$1,471,000

a 1923-1925 = 100.0; *z* Revised.



Paint sales are running considerably ahead of '35 totals.

With but one exception (December 1935) construction contracts let during April were higher than for any other month since October 1931, according to figures from F. W. Dodge Corp. April awards amounted to $234,806,300 in the 37 states east of the Rocky Mountains as contrasted with $198,978,300 for March and only $124,020,000 for April, 1935. All major branches of construction shared in the general gains, with non-residential building and heavy engineering projects showing the best relative improvement over a year ago.

Market for Raw Materials

The naval stores markets in the primary centers were more active last

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Stock Portfolios Reduced in March

Concretely in line with the Brookmire policy and within 6% of the top of the year-long rise, recently culminated, Brookmire repeatedly urged clients to sell stocks and to reduce sharply their investments. Of the 111 stocks included in Brookmire List, 91 were specifically eliminated during successive selling recommendations, at substantial average appreciation.

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month, and, as a result, a shade more optimism is noted. Considerable tank car business in turpentine was placed for domestic consumption, but foreign inquiries were disappointing. On the other hand, foreign rosin shipments were better. Prices moved within a narrow limit; rosin showing a net gain for the month while turpentine closed out ½c lower. A comparison of quotations at Savannah on May 29th and April 30th shows the following changes:

	May 29	Apr. 30	Net change
B	$3.25	$3.15	+$0.10
D	3.90	3.85	+ .05
E	3.95	3.85	+ .10
F	4.30	4.25	+ .05
G	4.30	4.25	+ .05
H	4.30	4.25	+ .05
I	4.30	4.25	+ .05
K	4.35	4.30	+ .05
M	4.45	4.35	+ .10
N	4.45	4.45	.....
WG	4.45	4.50	— .05
WW	4.60	4.50	+ .10
X	4.60	4.50	+ .10
Turpentine	.35½	.36	— ½c

The shellac market was slightly more active last month than it was in April. While purchasing was largely of the hand-to-mouth variety, some forward purchasing was reported. Bleachers are somewhat disappointed in the volume of business placed so far. Some talk is heard in the industry of the likelihood of revising bonedry quotations at higher levels.

Importers of varnish gums report contract customers are taking close to normal quantities but complain that there is very little spot and forward business at the moment. Importers are of the opinion that any sizable amount of forward purchasing would result in several rather sharp advances in the primary centers. Several price changes were announced, including a ¼c reduction in CNE Manila gum, a ½c decline in Copal Congo No. 8, a ⅜c reduction in Hiroe, Macassar nubs, a ¾c advance in Copal Congo No. 1, an ⅛c increase in No. 22, and a ⅜c loss in No. 21.

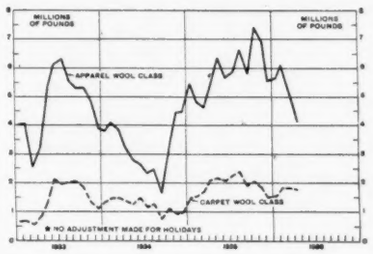
The wax markets were quiet last month with price changes limited to a downward revision in quotations on Carnauba. Despite the present shading in this item the general feeling is that higher prices are inevitable. It is reported that the unsold stocks in Brazil are inadequate for world-wide needs between now and the time when the new crop becomes available. The beeswax market is specially firm at the time.

The Biology, Chemistry, and Physics Departments of Johns Hopkins will hold a research conference this summer at Gibson Island near Baltimore. Conference, under the general direction of Neil E. Gordon, will run 5 weeks—June 22 to July 24. A number of the outstanding technologists of the country are scheduled to speak.

Tanning and Textile Operations are Disappointing

Sharp Curtailment in Cotton Cloth Manufacture Expected—Shoe Production Declines Below Last Year's Pace—Market for Textile and Tanning Chemicals Quiet—

The relatively poor rate of chemical consumption in both the tanning and textile fields was all the more pronounced because of the high rate of activity in such lines as the paint, paper and glass fields. According to reliable reports, cotton cloth production schedules are to be drastically cut, for consumption has not kept pace with manufacturing and stocks



Current wool consumption is under 1935 figures.

are said to be accumulating. Mills consumed 576,762 bales of cotton during April, an increase of approximately 109,000 bales, or 23%, from the amount consumed in April last year, and an increase of about 28,000 bales over the amount they used in March. The figure was the highest for any April since 1929, when 632,000 bales were consumed. Not only did cotton mills consume more cotton in April than in March, reports of curtailment notwithstanding, but the daily rate of mill activity in April proved the highest for any April for at least 15 years. However, the May consumption figures are likely to show a sharp decline and further curtailment in June is anticipated.

Activity in the silk and rayon fields slowed down slightly in May, according to preliminary estimates in the trade. Deliveries of silk to American mills in April (including re-exports) amounted to 34,564 bales compared with 36,000 bales in March and a 1935 monthly average delivery of 41,000 bales. The rate of non-acetate rayon deliveries to American mills in April is measured by the *Rayon Origanon* index of 433 which compares with a March index of 422 and a 1935 monthly average of 446. Adjusted for normal seasonal variation, this index increased 4% from March to April.

The chemical industry is feeling the decided trend away from heavily-weighted silks and the ascendency of pure-dye and all-silk fabrics. Consumption of disodium phosphate and tin salts has declined sharply as a result of this trend.

Consumption of wool is still below the comparative figures for a year ago. In making this comparison, however, it must be borne in mind that '35 was a banner year in the woolen business.

Important Price Changes

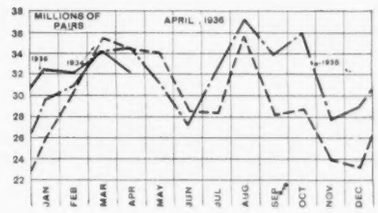
ADVANCED

	May 29	Apr. 30
Sumac, grd.	$60.00	$52.00

DECLINED

Mangrove bark	$26.50	$27.00

Tanners are still holding operations on a very conservative basis. Although April production of shoes fell below that for the corresponding month of 1935, the total for the year to date is still running ahead by a little less than 2%, and the April figure was put at 33,500,000 pairs, against 33,596,000 pairs in March and 34,546,000 pairs in April, '35. Including the April estimate, output for the 1st 4 months of this year was about 131,600,000 pairs, as compared with 129,231,000 pairs in the like period of '35. There is, however, a decided feeling in the trade



Shoe manufacturers fear surplus stocks.

that shoe production over the next few months at least will run below '35 totals. Stocks in dealers' hands are said to be still above normal.

Price changes in textile and tanning chemicals were relatively few last month. Sumac quotations were "upped" $6 per ton, thus offsetting the sudden weakness in this item reported in the May issue. The lower level for tin tetrachloride is reported on in detail in the Industrial Chemical News Section.

Despite the rather poor outlook at the moment, leather demand is expected to exceed last year's total materially even if shoe production continues below the 1935 record for the time being. Increased spending on luxury merchandise is benefitting production of luggage and small leather goods. Similarly, larger outlays for new industrial equipment and plant maintenance will improve the demand for leather belting.

New Textile Oil Maker

Haas-Miller Corp., Philadelphia, is organized by Harry L. Miller to produce textile oils. Mr. Miller was formerly vice-president and technical director for Quaker Chemical Products, Conshohocken, Pa.

What Do You Really Know About The Chemical Industry?

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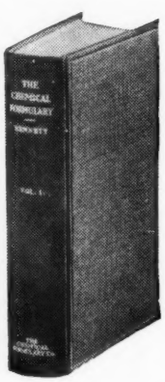

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Large Sale of Organic Ammoniates Reported

Atlanta Convention will Attempt to Solve Price-Cutting Problem—New Fertilizer Subsidy Plan Discussed—German Phosphate Producers Visit U. S.—

Feature of the raw fertilizer materials market last month was the sale of a large quantity of organic ammoniates. The trade was of the opinion that as much as 15,000 tons changed hands. The price structure was lower on blood, tankage and nitrogenous material, the direct result, of course, of the actual placing of orders involving such a large quantity. Last year the fish scrap producers "stole the initial opening" but so far the only appreciable order placed in the Baltimore area to date is said to have been one for 2,500 tons on a "when-and-if made" basis. Uncertainty surrounds the fish scrap market for a move is reported to revive the idea of taxing imports of fish scrap and meals at the rate of 5/8c per lb. or $12.50 a ton. The item is said to be scheduled for inclusion into the revenue bill in the form of a rider. Senator J. W. Bailey (Dem., N. C.) is the sponsor. The revival of this proposed tax caused importers of sardine meal to move with extreme caution.

There has been a decided lack of rain in the cotton sections and this is adversely affecting the consumption of dressing materials. Superphosphate consumption, it is reported, is showing signs of modest improvement.

The interest of the industry is now largely centered on the coming annual convention which is likely to prove to be one of the most important ever held. Aside from the plan for self-government the leaders are concerned over the Wheeler Bill in the Senate and the Patman Bill in the house which if passed will practically prevent as to interstate commerce the practice of selling fertilizer at delivered-to-the-farm prices, a custom widely used in the industry. In addition, the matter of price-cutting and the Administration's new soil conservation program which involves bonuses to farmers for using fertilizer are subjects of immediate interest.

Fertilizer prices in the South during the peak of the Spring selling season have been reduced $3 to $4 a ton below the initial list prices made by manufacturers, according to reports from that area. Tonnage has been better than last year, running generally 10% ahead with some states as much as 15% ahead of a year ago. However, any benefits from the larger volume will be more than offset by the drastic price declines which have carried the industry back to the same situation as before the NRA, which temporarily provided price stabilization. So far the situation in the northern states is somewhat better, but the bulk of the business is done in the South where the season is closing with an unprofitable price level prevailing.

Important Price Changes

ADVANCED

	May 29	Apr. 30
Calcium phosphate, precip.	$0.71	$0.66

DECLINED

Blood, dried, imp.	$2.60	$2.70
N. Y.	2.50	3.00
Chgo.	2.90	3.25
Nitrogenous mat., imp.	2.00	2.20
Western	1.85	1.90
Tankage, grd., N. Y.	2.65	2.85
Ungrd.	2.40	2.50
Chgo.	2.40	2.50

DEPT. OF LABOR STATISTICS

	Mar. '36	Mar. '35
Fertilizers & Materials:		
Exports	$2,047,000	$ 865,000
Imports	3,663,000	3,433,000

In many quarters the price war on phosphate rock which started last fall is blamed for the present conditions. This action, it is said, permitted the smaller producers to compete on a highly favorable basis with the larger manufacturers.

The soil conservation programs announced to date specify benefit payments to farmers for the use of limestone and superphosphate fertilizers. They provide bonuses of $1.40 per ton for the use of lime and $10 per ton for the use of 16% superphosphate, or approximately 50% of the cost of such fertilizers. To become eligible for these payments, farmers must apply the fertilizers before Oct. 31st on land devoted to the production of any crop that is classified as soil conserving, or on which specified legumes, annual grasses or green manure crops are seeded.

A delayed planting season in the South which had retarded the sale of fertilizer in the first quarter resulted in an unusually large volume of tonnage being sold in April. Tax tag sales during the month in the 12 reporting Southern States totalled 1,023,860 tons. This represented increases of 45% over April, '35 and 34% over April, '34, but was slightly under April, '33, when uncertainties concerning the agricultural adjustment program delayed the purchase of fertilizer and the sales peak was in April.

In every one of the 12 reporting states in the South sales were larger in April this year than in April, '35. Greatest percentage increases took place in South Carolina, Alabama, and Florida but all of the States with the exception of Mississippi and Tennessee reported relatively large increases.

Improvement in April was sufficient to raise the total sales in the 1st 4 months 6% above the corresponding period of last year; sales in the 1st 3 months had been 6% under '35. With the exception of Virginia, North Carolina, Texas, and Oklahoma, which registered small declines, all of the states have experienced larger sales this year than last.

Germans Visit Florida

According to Dr. Schmidt, spokesman for the group, most impressive and valuable part of their extensive trip was the visit to Florida pebble phosphate mines. Interviewed by a C. I. reporter, Dr. Schmidt said that his colleagues' greatest interest in coming to this country was to investigate the sources and method of obtaining and grading raw phosphate fertilizer materials which this country ships to German superphosphate processing plants abroad. Mining and grading methods at Florida mines are far in advance of anything his group has ever seen, Dr. Schmidt said. Visits to several state agricultural experiment stations also were enlightening. Trip aided greatly in providing better spirit of understanding between American raw materials producers and German processors, the group believed.

Oils and Fats

China's production and distribution of vegetable oils, including tung and perilla, was placed under Government control by an executive decree issued May 12th, according to a radio report to the Department of Commerce from Commercial Attache Julean Arnold, Shanghai.

Decree provides for establishment of a semi-official corporation, capitalized at 2,000,000 yuan (approximately $740,000), to be known as the China Vegetable Oil Refinery, Ltd., which will function as agent for China's vegetable oil industry, with the view to standardizing and improving production and will have complete control over processing and storing tung, perilla and other vegetable oils, report states. Corporation will also arrange financing, transportation and marketing facilities for the vegetable oil industry and is authorized to manufacture lubricating oils, paints and varnishes. Headquarters of the corporation will be located at Shanghai and 8 branch plants will be established in various producing districts.

Proposed Import Duties

Consumers of those vegetable oils which are largely imported were aroused last month by the proposal to place a 4½c tax per lb. on such items as tung, perilla, olive oil foots, sesame, sunflower, etc. After a storm of protest, led chiefly by the paint industry, the Senate Committee on Finance rejected the Bailey amendment to the extent of eliminating tung and perilla.

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INDUSTRIAL CHEMICALS

Several Important Dividend Increases Announced

U. S. I. Halves Dividend — Stock Values Registered Slight Increase in May — Cyanamid Nets $738,015 in the First Quarter—

Varying business conditions within the chemical industry are reflected in company dividend reports for the 1st quarter of '36. Announcement by Hercules Pow-

Stocks showed signs of recovery in May.

der that the rate on the common would be raised to $5, or a quarterly dividend of $1.25 compared with former 75c quarterly, contrasts sharply with U. S. I.'s reduction of its quarterly payment from 50c to 25c. Destructive price cutting has taken its toll of alcohol earnings, and it is believed locally that U. S. I. will report a deficit for the 1st 6 months of '36.

Other optimistic dividend news includes Union Carbide's quarterly of 60c a share, against 50c paid in 2 preceding quarters, and du Pont's extra quarterly dividend of 70c, in addition to the regular dividend of 90c on common and $1.50 on debenture stock. St. Joseph Lead also increased its dividend for the 1st quarter to 20c a share, compared with former payments of 10c.

Columbian Carbon's Special

Increased 1st quarter sales and earnings of Columbian Carbon resulted in a special 50c dividend being declared in addition to the usual $1 quarterly, both payable June 1 to stock record of May 15. Sales of natural gas for the first 2 months of the year were running 50% ahead of '35, while company sales generally were put at 15% over '35 figures, according to company estimates. Columbian Carbon has increased its gas reserves tremendously since the 1st of the year, specially in the Kanawha County, W. Va., section.

Stocks Rise in Slow Trading

The stock market made slow progress during the greater part of last month but in the final week did stage a rally which helped to materially reduce the sharp losses that occurred in April. Trading during the 30-day period was rather light. The recovery, small as it was, was really surprising. Significant is the fact that buyers came into the market despite the continued debate in Washington on the taxation program, the impending political campaign and the many foreign developments of a disquieting nature. Indications of a relatively small seasonal decline in a few lines of industry, and hopefulness regarding the future, probably prompted some of the stock acquisitions, while the pressure of the huge mass of idle funds also remains an important factor.

Movement in the chemical group was decidedly mixed. Several outstanding gains were registered, including a 15 point rise in Allied, a 13¼ point rise in Columbian Carbon and an 8 point rise in Hercules. On the other hand, Monsanto dropped 8¼ points and U.S.I. declined 10⅜ points. The heavy loss in the latter was brought about by the belief that the directors would lower the dividend rate. The interest in Air Reduction slackened too as a result of the cutting of U.S.I.'s rate in half. The increases in Carbide, Columbian Carbon and duPont were partially at least the result of the raising of the dividend rates or the declaration of special ones.

Probable Dow Earnings

Earnings of Dow Chemical in the fiscal year ended May 31, '36 are expected to be materially ahead of '35 and also larger than in '34, the company's best previous year. On this basis, net for 1936 fiscal year may be estimated at between $3.60 and $4.00 a share on the 945,000 shares of common stock outstanding. Net profit in 1935 was $3,320,970 equal after preferred dividends to $3.32 a share and in 1934 was $3,577,651 equal to $3.57 a share on the present capitalization.

Retirement of all V.-C. 7% prior preferred stock held in the company treasury was announced by A. L. Ivey, president, last month. Special stockholders meeting

Price Trend of Chemical Company Stocks

	Apr. 30	May 8	May 15	May 22	May 29	Net gain or loss last month	Price on May 31, 1935	1936 High	1936 Low
Air Reduction	60	58¼	60¼	58½	60	.....	129⅝	61⅞	58
Allied Chemical	182	181¾	192½	189⅞	197	+15	145	208	157
Columbian Carbon	107¼	112	116	117⅝	121	+13¼	83½	134	94
Com. Solvents	17⅝	17¼	17¾	16¾	16⅞	— ¾	19⅛	24⅝	†16⅜
du Pont	139	138⅛	141¼	141¾	142½	+ 3½	97¼	153	133
Hercules Powder	*w*90	87	87	*x*89¼	98	+ 8	77	105½	84
Mathieson	28	29¼	30	29½	29½	+ 1½	28½	36½	27½
Monsanto	94	83⅛	84¾	79¾	85¾	— 8¼	72¼	103	†79
Std. of N. J.	58⅞	59	60⅜	57¼	58⅞	.....	45¾	70	51⅛
Texas Gulf S.	34¼	34⅞	35⅝	35¼	35	+ ¾	33½	38¾	33
Union Carbide	77¼	78¼	81½	81½	84¼	+ 7	55½	88⅜	71⅝
U. S. I.	47½	45¾	45⅞	38⅛	37⅛	—10⅜	41	59	†36¾

† New lows in May; *w* On Apr. 29; *x* On May 21.

Dividends and Dates

Name	Div.	Stock Record	Payable
Abbott Lab.	75c	June 18	July 1
Abbott Lab., extra	10c	June 18	July 1
American Euka	25c	June 17	July 1
Armour of Del., 7% pf.	$1.75	June 10	July 1
Atlas Powder, ext.	25c	May 29	June 10
Atlas Powder	50c	May 29	June 10
Bon Ami "A"	$1.00	July 15	July 31
Bon Ami "B"	50c	June 19	July 1
Brit. Celanese, 1st pf.	7%	Apr. 30	.....
Calif. Ink, ext.	12½c	June 30	July 1
Calif. Ink	.50c	June 30	July 1
Celanese Corp. of Am., 7% pr. pf.	$1.75	June 16	July 1
Celanese Corp. of Am., 7% 1st pt. pf.	$3.50	June 16	June 30
Celluloid, 1st pf.	$2.00	June 2	June 12
Chickasha Cotton Oil	50c	June 10	July 1
Colgate-Palmolive-Peet	12½c	May 6	June 1
Colgate-Palmolive-Peet, pf.	$1.50	June 6	July 1
Columb. Carbon, special	50c	May 15	June 1
Columb. Carbon	$1.00	May 15	June 1
Com. Solvents	30c	June 1	June 30
Comp. Ind. Gases	50c	May 31	June 15
Dow Chemical, pf.	$1.75	Aug. 1	Aug. 15
du Pont, ext.	70c	May 27	June 15
du Pont	90c	May 27	June 15
du Pont, deb.	$1.50	July 10	July 25
Eastman Kodak, ext.	25c	June 5	July 1
Eastman Kodak	$1.25	June 5	July 1
Eastman Kodak, pf.	$1.50	June 5	July 1
Fansteel Metallurgical, pf.	$1.25	June 15	June 30
Fansteel Metallurgical, pf.	$1.25	Sept. 15	Sept. 30
Fansteel Metallurgical, pf.	$1.25	Dec. 15	Dec. 31
Freeport Texas	25c	May 14	June 1
Freeport Texas, pf.	$1.50	July 15	Aug. 1
Glidden	50c	June 18	July 1
Glidden, pr. pf.	$1.75	June 18	July 1
Hercules Powder	$1.25	June 12	June 25
Heyden Chem.	25c	May 22	June 1
Int'l Salt	37½c	June 15	July 1
I. C. I. (A.D.R.) Ord.	5½%	Apr. 17	June 8
Int'l Nickel	30c	June 2	June 30
Koppers Gas & Coke, pf.	$1.50	June 12	July 1
Lindsay Light & Chem., pf.	17½c	June 6	June 15
Mathieson Alk.	37½c	June 11	June 30
Mathieson Alk., pf.	$1.75	June 11	June 30
Merck	10c	June 15	July 1
Merck, pf.	$1.50	June 15	July 1
Monroe Chem.	25c	June 13	July 1
Monroe Chem., pf.	87½c	June 13	July 1
Monsanto, extra	25c	May 15	June 15
Monsanto	25c	May 15	June 15
Nat'l Lead (new)	12½c	June 12	June 30
Nat'l Lead, Cl. B, pf.	$1.50	July 17	Aug. 1
Nat'l Lead, pf. A	$1.75	May 29	June 15
Penick & Ford	75c	June 1	June 15
P. & G., 5% pf.	$1.25	May 25	June 15
Sherwin-Williams, Ltd., pf.	$1.75	June 15	July 2
Sherwin-Williams (new), 5% pf.	$1.25	May 15	June 1
Texas Gulf S.	50c	June 1	June 15
Tubize-Chatillon, pf.	$3.50	May 21	June 1
Tubize-Chatillon, pf.	$1.75	June 10	July 1
Union Carbide	60c	June 5	July 1
United Dyewood, pf.	$1.75	June 11	July 1
United Dyewood, pf.	$1.75	Sept. 11	Oct. 1
United Dyewood, pf.	$1.75	Dec. 11	Jan. 1 '37
U. S. I.	25c	June 15	July 1
Westvaco Chlorine, ext.	10c	May 15	June 1
Westvaco Chlorine	10c	May 15	June 1

approved this action which had been recommended by the directors. V.-C. is now controlled entirely by holders of 6% and common stock, thus obviating, it is hoped, future fights among different classes of stockholders, such as characterized stockholders meetings last year. Canceled stock reduced the original capital by $14,487,100 and included 38,000 shares which were in the hands of the public.

Following the retirement on June 1 of all 7 per cent. prior preference stock, 6 directors of the company, representing that class of stock, submitted their resignations.

Announcement of the resignations was made after a meeting of the board of directors.

The 6 directors who resigned were Sherlock Bronson, Alexander Berger, Wymond Sabell, J. Luther Moon, B. B. Munford and Thomas B. Scott.

The resignations were submitted in accordance with a prearranged plan. The board, after accepting them, adopted a by-law reducing the number of directors from fifteen to nine.

Earnings Statements

Report of American Cyanamid and subsidiaries for the 1st quarter, subject to audit and year-end adjustments, shows net income of $738,015 after depreciation, depletion, research and process development expense, interest, federal taxes, minority interest, etc., equivalent to 29c a share (par $10) of combined 2,520,368 shares of Class A and Class B common stocks outstanding, excluding shares held by subsidiaries. This compares with $638,305 or 25c a share on combined Class A and Class B shares in March quarter of previous year.

Commercial Solvents

Net profit of Commercial Solvents in the 1st quarter of this year was $617,778 after depreciation, interest, Federal taxes and other charges. This was equivalent to 23c each on 2,636,636 shares of no-par common stock. In the corresponding quarter of '35, company earned $564,860, or 21c a share, on 2,636,110 shares then outstanding.

N. J. Zinc

Report of New Jersey Zinc for the 1st quarter shows net income of $1,074,179 after taxes, depreciation, depletion, contingencies, etc., equivalent to 55c a share on 1,963,264 shares (par $25) of stock. This compares with $1,060,889 or 54c a share in March quarter of previous year.

American I. G.

Report of the American I. G. for fiscal year ended Mar. 31, '36, certified by independent auditors, shows net income of $3,302,939 after federal taxes, interest, etc., equivalent under the participating provisions of the shares, to $4.17 a share on 491,647 no-par shares of Class A common stock and 42c a share on 3,000,000 shares (par $1) of Class B common. This compares with net income in preceding year of $2,527,867 or $3.22 a share on Class A and 32c a share on Class B stocks.

United Carbon

Report of United Carbon and subsidiaries for quarter ended Mar. 31st, shows net profit of $567,831 after federal taxes, depreciation, depletion and other charges, equivalent to $1.42 a share on 397,885 no-par shares of common stock outstanding. This compares with net profit in March quarter of previous year of $477,633, equal to $1.21 a share on 394,327 shares.

United Chemicals

Report of United Chemicals, Inc., and subsidiaries for the 1st quarter shows net loss of $5,662 after depreciation, taxes, etc., comparing with net loss of $14,102 in March quarter of previous year. Current assets as of Mar. 31st, amounted to $1,477,009 and current liabilities were $156,692 comparing with $1,292,185 and $117,273 respectively, on Mar. 31, '35.

Westvaco Chlorine

Report of Westvaco Chlorine and subsidiaries for quarter ended Mar. 28th, shows net profit of $162,699 after depreciation, federal taxes, etc., equivalent after dividend requirements on 7% preferred stock, to 43c a share on 284,962 no-par shares of common stock. This compares with $162,233 or 43c a share on common in March quarter of previous year. For 12 months ended Mar. 28, '36, net profit was $618,809 after charges and taxes, equal to $1.63 a share on common comparing with $597,916 or $1.56 a share on common for the 12 months ended Mar. 30, '35.

Glidden Co.

Report of Glidden Co. and subsidiaries (paints, varnishes, etc.), for 6 months ended April 30, '36, shows net profit of $867,756 after interest, depreciation, federal taxes, etc., equivalent after dividend requirements on 7% prior preference stock, to 80c a share on 800,000 no-par shares of common stock, outstanding at end of the period. This compares with $1,217,152, or $1.52 a share, on 650,000 common shares for the 6 months ended April 30, '35.

Statistics of Business

	April 1936	April 1935	March 1936	March 1935	February 1936	February 1935
Automotive production	.....	447,546	323,160	280,758	218,270	220,162
Bldg. contracts*‡	$234,806	$124,020	$199,028	$122,941	$142,050	$75,047
Failures, Dun & Bradstreet	.....	1,115	.....	976	856	971
Merchandise imports‡	$202,437	$170,500	$200,295	$177,356	$192,821	$152,491
Merchandise exports‡	$193,490	$164,151	$195,336	$185,026	$182,630	$162,999
Newsprint Production						
Canada, tons	258,721	222,244	243,900	205,682	221,569	180,305
U. S., tons	76,470	74,891	76,507	73,528	72,252	70,805
Newfoundland, tons	25,224	26,288	24,095	28,399	24,047	24,604
Mexico, tons	.....	1,337	.....	1,992	171	1,743
Total, tons	360,415	324,760	344,502	309,595	318,039	277,457
Plate glass prod., sq. ft. ...	19,454,774	16,998,914	16,057,196	16,531,950	13,856,937	13,723,151
Steel ingots production, tons	3,942,254	2,640,602	3,346,489	2,868,141	2,967,803	2,777,765
Steel activity, % capacity..	69.09	45.88	58.65	49.83	54.09	52.28
Pig iron production, tons ..	2,403,311	1,663,475	2,040,311	1,770,028	1,827,972	1,608,552
U. S. consumption, crude rubber, tons	51,897	44,714	42,703	42,620	36,746	43,187
Tire shipments	.....	.....	3,855,970	4,204,131	3,211,040	.....
Tire production	.....	.....	3,637,969	4,345,581	3,577,221	.....
Tire inventory	.....	.....	9,087,020	11,675,268	9,264,595	.....
Dept. of Labor Indices†						
Factory payrolls, totals†..	77.9	70.8	*z*76.3	70.8	72.3	69.1
Factory employment†	85.1	82.6	*z*84.1	82.5	83.2	81.4
Chemical employment†*a* ..	110.7	112.3	113.2	113.9	109.1	109.4
Chemical payrolls†*a*	100.9	95.9	*z*102.2	96.0	97.5	93.2
Chemicals and Related Products						
Exports‡	.....	.....	$10,608	$9,286	$8,959	$7,503
Imports‡	.....	.....	$7,327	$7,082	$7,849	$6,108
Stocks, mfd. goods	.....	.....	132	122	128	122
Stocks, raw materials ...	.....	.....	81	92	89	98
Cement prod., ratio of prod. to capacity	39.2	27.9	23.4	18.9	16.4	14.9
Anthracite prod., tons	.....	.....	*y*2,741,000	3,082,000	6,461,000	4,505,000
Bituminous prod., tons	.....	.....	*y*30,692,000	38,701,000	41,375,000	34,834,000
Boot and shoe production..	32,166,709	34,564,411	34,159,271	.....	.....	.....

	Carloadings			Electrical Output§			Jour. of Com. Price Index	‡‡Labor Dept. Chem. & Drug Price Index	National Fertilizer Association Indices				% Steel Activity	N. Y. Times Index Bus. Act.	Fisher's Index Pur. Power
Week Ending	1936	1935	% of Change	1936	1935	% of Change			Chem. & Drugs	Fats & Oils	Fert. Mat.	Mixed Fert.	All Groups				
Apr. 25.....	666,181	558,836	+19.2	1,932,797	1,673,295	+15.5	80.3	78.2	94.4	72.0	65.7	67.4	76.7	70.4	99.1	121.2
May 2.....	671,154	568,927	+18.0	1,928,803	1,698,178	+13.6	79.3	77.8	94.4	70.3	65.7	67.4	76.1	71.2	....	121.6
May 9.....	668,935	575,020	+17.4	1,947,771	1,701,702	+14.5	78.0	77.5	94.4	69.0	65.6	67.4	75.8	70.1	....	122.6
May 16.....	681,447	582,950	+16.9	1,961,694	1,700,022	+15.4	77.3	77.3	94.4	68.0	65.6	*z*70.7	75.1	69.1	100.3	123.4
May 23.....	683,406	598,396	+14.2	1,954,830	1,696,051	+15.3	78.6	77.3	94.4	66.4	65.6	70.7	75.4	69.4	99.4	124.2
May 30.....	.....	.....	.....	.....	.....	.....	79.6	....	....	....	....	....	....	67.9	....	123.2

* 37 states; † Dept. of Labor, 3 year average, 1923-1925 = 100.0; ‡ 000 omitted; § K.W.H., 000 omitted; *a* Includes all allied products but not petroleum refining; ‡‡ 1926-1928 = 100.0; *y* Preliminary; *z* Revised.

OTHER EASTMAN CHEMICALS

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Hydroquinone

Silver Nitrate

Pyrogallic Acid

Cellulose Acetate

Nitrocellulose Products

Research Organic Chemicals

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GALLIC ACID

U. S. P.-TECH.

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Casein
Dibutyl Phthalate — Dimethyl Phthalate
Diethyl Phthalate — Triphenyl Phosphate
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372 Bay Street, Toronto 2, Canada

AMERICAN-BRITISH
CHEMICAL SUPPLIES, Inc.
180 MADISON AVE., NEW YORK

Chemical Stocks and Bonds

Last	1936 May High	Low	1935 High	Low	1934 High	Low	Sales	Stocks	Par $	Shares Listed	An. Rate*	Earnings $-per share-$ 1935	1934
NEW YORK STOCK EXCHANGE							Number of shares May 1936	1936					
60	64¾	56¼	57½	35	37⅝	30⅝	36,700	85,100	Air Reduction	No	2,523,864	....	2.10	1.66
199	208	157	173	125	160¾	115⅞	17,800	200,300	Allied Chem. & Dye	No	2,214,099	$6.00	8.71	6.83
50	63¼	50	57¾	41½	48	25¼	6,700	55,500	Amer. Agric. Chem.	100	315,701	2.00	.....	*p*6.37
23	32⅝	22⅛	35¾	22½	62½	20¾	11,800	162,500	Amer. Com. Alcohol	20	260,716	None	3.16	3.57
37	50	37	52	36	39½	26¼	4,700	40,100	Archer-Dan-Midland	No	541,546	1.50	.....	*p*4.21
60	73	48	48½	32¾	55½	35¼	500	23,400	Atlas Powder Co.	No	234,235	2.25	2.81	2.49
124⅜	116¼	112	115	106¾	106¾	83	480	3,770	6% cum. pfd.	100	88,781	6.00	16.93	13.54
23⅜	32¼	21¾	35⅜	19½	44⅞	17⅛	35,700	523,400	Celanese Corp. Amer.	No	987,800	.50	1.99	1.25
14	20½	13¼	21	15⅛	18⅛	9⅜	45,800	252,300	Colgate-Palm.-Peet	No	1,985,812	.75	1.36	1.16
104	106½	102⅜	107¼	101	102½	68½	2,800	8,000	6% pfd.	100	254,500	6.00	16.79	16.14
121	134	94	101¼	67	77¼	58	8,600	72,000	Columbian Carbon	No	538,154	4.50	5.56	3.93
16⅞	24⅝	16⅜	23⅞	16½	36¾	15¼	106,700	1,267,800	Commer. Solvents	No	2,635,371	.60	1.02	.89
78	78½	68½	78⅜	60	84½	55½	42,900	291,400	Corn Products	25	2,530,000	3.00	2.62	3.16
164⅛	168½	162	165	148¾	150½	135	400	3,000	7% cum. pfd.	100	243,739	7.00	33.97	39.65
52¼	58	42	50⅜	35½	55¼	29	1,200	33,600	Devoe & Rayn. A	No	95,000	2.00	.....	2.36
143¾	153	133	146½	86¾	103⅞	80	47,300	212,900	DuPont de Nemours	20	10,871,997	3.60	5.04	3.63
129¾	135	129⅛	132	126⅞	128½	115	2,900	12,900	6% cum. deb.	100	1,092,699	6.00	56.94	42.73
161½	170½	156	172¼	110½	116½	79	7,600	55,900	Eastman Kodak	No	2,250,921	5.75	6.90	6.28
162	166	158	164	141	147	120	1,380	2,210	6% cum. pfd.	100	61,657	6.00	258.09	235.22
30	35⅝	27½	30⅝	17¼	50⅜	21½	18,700	200,100	Freeport Texas	10	784,664	1.00	1.78	1.76
119	135	119	125	112½	160½	113½	130	910	6% conv. pfd.	100	25,000	6.00	121.30	120.08
45⅞	55¼	44¼	49½	23⅜	28⅜	15⅝	21,900	168,600	Glidden Co.	No	603,304	2.00	.....	*x* 2.91
106¼	114½	105⅜	111	104⅞	107½	83	2,630	8,710	7% pfd.	100	63,044	7.00	.....	*x*40.70
135	135	120	119½	85	96⅞	74	200	9,300	Hazel Atlas	25	434,409	5.00	7.58	5.21
98	105½	84	90	71	81⅝	59	1,300	29,300	Hercules Powder	No	582,679	3.50	4.23	3.94
128½	135	128	131	122	125¾	111	110	2,120	7% cum. pfd.	100	105,765	7.00	36.30	28.79
27	34⅝	25⅝	36⅜	23½	32	19⅜	21,700	222,000	Industrial Rayon	No	600,000	1.68	1.00	2.23
3⅛	5⅞	3	5	2⅝	6⅛	2	21,500	260,800	Intern. Agricul.	No	436,049	None	.....	*p*—.99
26½	41	26	42¾	26	37¼	15	3,400	46,700	7% cum. pr. pfd.	100	100,000	None	.....	*p*2.69
47⅛	54¼	43¼	47¼	22¼	29¼	21	168,500	1,084,800	Intern. Nickel	No	14,584,025	1.20	1.65	1.14
25	29¼	23	36¼	25	32	21	1,400	16,700	Intern. Salt	No	240,000	1.50	1.32	2.02
31½	36¾	29¾	36¼	31	33⅛	15¾	1,600	15,900	Kellogg (Spencer)	No	500,000	1.60	....	*v*2.22
53	63⅛	47¼	49¼	21½	43⅞	22½	30,100	337,200	Libbey Owens Ford	No	2,559,042	2.00	3.26	1.25
35⅛	44¼	34	37¼	24½	35⅜	16⅛	9,100	92,700	Liquid Carbonic	No	342,406	1.60	....	*v*2.58
29⅞	36½	27½	33⅜	23¾	40¾	23½	11,300	165,300	Mathieson Alkali	No	650,436	1.50	1.44	1.20
90	103	79	94¾	55	61⅝	39	24,200	69,100	Monsanto Chem.	10	864,000	1.25	3.84	3.03
30	30½	20⅜	20⅝	14½	17	13½	17,500	27,725	National Lead	10	3,098,310	.50	1.08	.84
160	162½	150	162½	150	146½	122	.....	700	7% cum. "A" pfd.	100	243,676	7.00	25.40	20.12
141½	143	137¾	140½	121⅝	121½	100½	210	2,200	6% cum. "B" pfd.	100	103,277	6.00	49.05	35.36
10	13¾	9	10⅞	4⅜	13	5½	17,000	428,000	Newport Industries	1	519,347	None	.57	.31
148	164	128	129	80	94	60	8,800	73,300	Owens-Illinois Glass	25	1,200,000	5.00	6.52	5.41
41	49	40¼	53¼	42⅜	44⅜	33⅛	19,400	128,200	Procter & Gamble	No	6,410,000	1.70	.....	*p* 2.23
119	122½	117¾	121	115	117	102½	530	2,070	5% pfd. (ser. 2-1-29)	100	171,569	5.00	.....	*p*88.13
7⅞	10¼	5⅜	8¾	4	6¾	3⅛	33,600	317,300	Tenn. Corp.	5	857,896	None	.22	.27
35½	38¾	33	36¾	28¾	43¼	30	31,700	277,300	Texas Gulf Sulphur	No	2,540,000	2.00	1.94	1.81
85	88⅜	71⅝	75¾	44	50⅞	35⅞	66,700	393,300	Union Carbide & Carbon	No	9,000,743	2.40	3.06	2.28
77	79¼	68	78	46	50⅜	35	12,500	76,400	United Carbon	No	370,127	2.40	4.71	3.55
37¾	59	36¾	50⅝	35⅛	64¾	32	94,300	469,000	U. S. Indus. Alco.	No	391,033	2.00	2.16	4.04
19⅛	27¼	16¼	21¾	11¼	31¾	14	18,300	272,100	Vanadium Corp.-Amer.	No	366,637	None	—1.13	—2.29
5⅞	8⅜	4⅛	4⅝	2½	5⅜	1⅞	20,500	299,600	Virginia-Caro. Chem.	No	486,000	None	.....	*p*—.79
34½	48¾	32	35¾	17½	26	10	10,500	178,100	6% cum. part. pfd.	100	213,392	None	.....	*p*4.20
133⅜	133⅜	105	120½	85	84	59¾	400	8,500	7% cum. prior pfd.	100	60,000	8.00	.....	*p*23.50
21½	28½	21	25½	16¾	27¼	14⅞	5,600	60,600	Westvaco Chlorine	No	284,962	.50	1.63	1.55
NEW YORK CURB EXCHANGE														
35¼	40¾	29¼	30	15	22½	14⅜	53,400	296,800	Amer. Cyanamid "B"	No	2,404,194	.60	1.61	.99
2¾	3¼	2¼	4	2	4½	2⅜	600	8,800	British Celanese Am. R.	10	2,806,000	None	.....	....
103	116¼	99¼	115	90	105¼	81	1,000	6,125	Celanese, 7% cum. 1st pfd.	100	144,379	7.00	21.96	16.37
109	116	107¼	111¼	97½	102	83	400	3,825	7% cum. prior pfd.	100	213,668	7.00	35.34	28.13
11	16½	10½	15	7	19	7	1,500	4,450	Celluloid Corp.	15	194,952	None	—.95	—1.67
12¼	15	11⅞	14½	11¼	14⅜	10½	500	2,900	Courtaulds' Ltd.	1 £	24,000,000	7½%	.....	7.57%
102¼	124¾	94⅛	105½	80½	91	67½	2,600	31,900	Dow Chemical	No	945,000	2.00	.....	3.32
7⅝	10¾	7	12½	6¼	10¾	4	2,800	39,800	Duval Texas Sulphur	No	500,000	None	.16	*z* .25
48¾	55	43½	58	37	40¾	19	500	4,300	Heyden Chem. Corp.	10	147,600	1.25	3.22	3.07
120	140	98¼	97¼	46¾	57½	39	4,000	38,540	Pittsburgh Plate Glass	25	2,141,305	3.00	5.32	2.69
122½	145½	117	128⅞	84	90½	47¼	5,800	43,250	Sherwin Williams	25	635,583	4.00	.....	*y*6.19
113½	116	110¾	113½	106	109¾	100	240	3,490	5% pfd. cum.	100	155,521	5.00	.....	*y*33.17
PHILADELPHIA STOCK EXCHANGE														
125	130	114¼	116¾	76½	75	50¼	250	1,470	Pennsylvania Salt	50	150,000	4.00	*w*7.79	*w*4.86

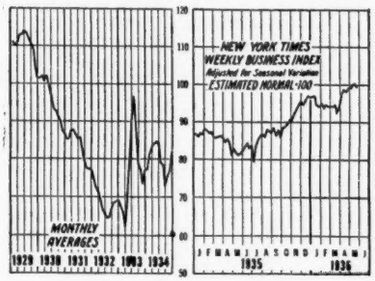
Last	1936 May High	Low	1935 High	Low	1934 High	Low	Sales	Bonds	Date Due	Int. %	Int. Period	Out-standing $
NEW YORK STOCK EXCHANGE							May 1936	1936				
112½	117½	111½	116	104½	106¾	83⅞	362,000	2,015,000	Amer. I. G. Chem. Conv. 5½'s	1949	5½	M. N.	29,929,000
27½	30⅜	23½	29¾	7⅜	17¾	5	100,000	1,761,000	Anglo Chilean s. f. deb. 7's	1945	7	M. N.	12,700,000
97¾	101¾	92½	94½	77⅜	88	61½	29,000	534,000	By-Products Coke Corp. 1st 5½'s "A"	1945	5½	M. N.	4,932,000
99½	102¾	99	100¼	91⅜	92	62	139,000	458,000	Int. Agric. Corp. 1st Coll. tr. stpd. to 1942	1942	5	M. N.	5,994,100
27½	27½	21	21½	7	19½	5¼	940,000	6,424,000	Lautaro Nitrate conv. b's	1954	6	J. J.	31,357,000
85	88	66½	94	65	98½	89⅞	54,000	271,000	Montecatini Min & Agric. deb. 7's with war.	1937	7	J. J.	7,075,045
29⅛	35	29⅛	38	32⅛	74½	34½	.....	29,000	Ruhr Chem. 6's	1948	6	A. O.	3,156,000
104	105	103	104	91½	90	65½	32,000	248,000	Tenn. Corp. deb. 6's "B"	1944	6	M. S.	3,007,900
90	95¾	85¾	94¼	66	89½	62	44,000	509,000	Vanadium Corp. conv. 5's	1941	5	A. O.	4,261,000

† Year ended 5-31-35; *p* Year ended 9-30-35; *v* Year ended 8-1-35; *y* Year ended 8-31-35; *z* Year ended 8-31-35; * Including extras; *x* Year ended 10-31-35; *w* Years ended 3-31-35 and 3-31-36.

Industrial Trends

Business Activity Reaches New High Peak in May—Retail Trade is 10% Ahead of '35—Indications Point to Busy Summer Period—

Business activity, contrary to the normal seasonal trend, continued its upward swing, reaching a new high point for the past 6 years. Indications are that the trend would hold through June at least, with the strong possibility that activity this summer would hold at the present extremely high levels. Retail trade in May was at least 10 to 15% greater than in the corresponding month last year, and in certain sections the increase was much higher. Wholesale trade reported a heavy demand in most lines, and particularly so in the case of seasonal items. The general gain ran from 15 to 18%. Retailers are reported to be stocking more heavily, anticipating a wave of buying as soon as the soldiers' bonus payments are started.


NEW YORK TIMES
WEEKLY BUSINESS INDEX
Adjusted for Seasonal Variation
ESTIMATED NORMAL=100
MONTHLY AVERAGES
1929 1930 1931 1932 1933 1934
J F M A M J J A S O N D J F M A M J
1935
1936

N. Y. Times Index of Business Activity is at a high point for past 7 years.

The so-called heavy industries are holding production schedules set in April, and, in many instances, are finding it necessary to increase the rate of manufacturing activity. The automotive industry turned out approximately 450,000 units in May and the June total is expected to reach 400,000 as a minimum. It is now expected that steel activity will reach the highest level of the year sometime in June. Many consumers of steel are expected to come into the market in a large way anticipating the price increase which becomes effective July 1. The rubber centers are operating at a rapid pace, the tire replacement demand providing a welcome addition to the large call for original equipment. The paint and lacquer fields are seasonally busy and leading executives have voiced the opinion that sales this year will come close to the record made in '29. The glass industry is busy too, under the stimulus of improvement in the building field and increased sales of safety glass. Other groups reporting favorably include paper and petroleum. Only in the textile and tanning fields are there signs of uncertainty. The cotton cloth manufacturers are reported as ready to make a drastic cut in production schedules due to the fact that finished stocks are not moving out as rapidly as hoped for. Silk and woolen production is quiet and even rayon shipments at the end of May are showing some signs of slowing down from the peak reached earlier in the 1st part of the month. Tanners are still cautious on increasing operations, for although shoe production is still about 2% ahead of the record made last year, shoe manufacturers are now cutting down fearing further sizable additions to the surplus stocks that are known to exist.

Leading producers of rayon have reduced the price of short staple rayon by about 6c a pound and are at the same time going ahead with extensive plans for increasing production of this type over the next year. Present productive capacity in the country now is over 10,000,000 lbs., against an output of 5,000,000 of short staple last year. Based on expansion plans of several of the leading producers, capacity of from 30,000,000 to 40,000,000 lbs. annually seems likely some time in 1937. Production of all types of rayon in this country last year was 250,000,000 lbs.

The final disposition of the Government owned stocks still acts as a deterrent on any bull movement in naval stores. A committee of the industry is actively at work on several suggestions for handling this situation. It is reported that the plan of asking further Government loans has just about been discarded. A plan whereby production will be cut about 25% appears to be gaining favor. One bullish factor worth considering is that rosin stocks to date in the new season arriving at the primary centers are below the corresponding figures for the same period of last year. It is estimated that the decline is as much as 15%.

Car loadings touched a new high record in the last week of May with a total of 683,406 cars. The substantial gains that have been recorded month after month in the consumption of electrical power continued in May. The commodity markets generally took their lead from the stock market. The latter remained in a dormant state during most of the 30-day period despite the glowing reports on the state of business.

Aggregate net profits of 245 leading corporations engaged in various lines of industry and trade were 42% larger in the 1st quarter than in the corresponding period of 1935, and were the largest for the initial quarter of any year since 1930. Deficits were experienced by only 3 of 22 groups of industries.

All indications point to a continuation of good business conditions through June and part of July at least. The payment of the bonus is bound to give a definite lift to consumer purchasing power. However, it is felt in many quarters that the decline in the latter half of the summer will be all the more sharp and defined because of the present "baby boom" conditions now prevailing.

Earnings Statements Summarized

Company:	Annual dividends	Net income 1936	Net income 1935	Common share earnings 1936	Common share earnings 1935	Surplus after dividends 1936	Surplus after dividends 1935
American Cyanamid:							
g March 31 quarter	*w*$0.15	$738,015	$638,305	*c*$0.29	*c*$ .25	.....	.....
American I. G. Chemical:							
Year, March 31	§*b*.20	3,302,939	2,527,867	*u*.42	*u*.32	$548,470	$955,398
Amer. Zinc, Lead & Smelting:							
March 31 quarter	*f*....	†43,305	†26,230	....	....	.....	.....
Twelve months, March 31	*f*....	†236,225	*.....	....	....	.....	.....
Columbian Carbon Co.:							
g March 31 quarter	$4.00	1,027,011	787,055	1.91	1.46	*.....	*.....
Continental-Diamond Fibre:							
March 31 quarter	*w*.50	45,719	15,214	.10	.03	.....	.....
International Nickel:							
March 31 quarter	*w*.30	8,386,787	4,917,627	.54	.30	4,258,771	2,247,427
Liquid Carbonic:							
March 31 quarter	§1.60	†108,606	†74,521	....	....	.....	.....
Twelve months, March 31	§1.60	881,351	594,737	1.52	1.70	.....	.....
New Jersey Zinc:							
March 31 quarter	2.00	1,074,179	1,060,889	.55	.54	92,547	79,257
Texas Gulf Producing:							
March 31 quarter	*f*....	217,110	191,792	.24	.21	.....	.....
Twelve months, March 31	*f*....	823,498	796,098	.93	.89	.....	.....
United Carbon:							
March 31 quarter	2.40	567,831	477,633	1.42	1.21	.....	.....
United Chemicals:							
March 31 quarter	*f*....	†5,662	†14,102	....	....	.....	.....
Westvaco Chlorine:							
March 28 quarter	§.40	162,699	162,233	.43	.43	*.....	*.....
Twelve months, March 28	§.40	618,809	597,916	1.63	1.56	*.....	*.....

		1935	1934	1935	1934	1935	1934
Standard Oil of New Jersey:							
Year, December 31	§1.00	62,863,192	45,618,960	2.43	1.76	30,558,671	13,678,078

* Not available; † Net loss; § Plus extras; *b* On Cl. B shares; *c* On combined Cl. A and Cl. B shares; *f* No common dividend; *g* Report subject to audit and year-end adjustments; *u* On Cl. B stock under participating provisions; *w* Last dividend declared, period not announced by company.

Prices Current

Heavy Chemicals, Coal-tar Products, Dye-and-Tanstuffs, Colors and Pigments, Fillers and Sizes, Fertilizer and Insecticide Materials, Petroleum Solvents and Chemicals, Naval Stores, Fats and Oils, etc.

Chemical prices quoted are of American manufacturers for spot New York, immediate shipment, unless otherwise specified. Products sold f. o. b. works are specified as such. Import chemicals are so designated. Resale stocks when a market factor are quoted in addition to maker's prices and indicated "second hands."

Oils are quoted spot New York, ex-dock. Quotations f. o. b. mills, or for spot goods at the Pacific Coast are so designated.

Raw materials are quoted New York, f. o. b., or ex-dock. Materials sold f. o. b. works or delivered are so designated.

The current range is not "bid and asked," but are prices from different sellers, based on varying grades or quantities or both. Containers named are the original packages most commonly used.

Purchasing Power of the Dollar: 1926 Average—$1.00 - 1935 Average $1.21 - Jan. 1935 $1.23 - May 1936 $1.22

	Current Market	1936 Low	1936 High	1935 Low	1935 High
Acetaldehyde, drs, c-l, wgs lb.	... .14	... .14	... .14		
Acetaldol, 95%, 50 gal drs wks lb.	.21 .25	.21 .25	.21 .25		
Acetamide, tech, lcl, kegs..lb.	.38 .43	.38 .43	.38 .43		
Acetanalid, tech, 150 lb bbls lb.	.24 .26	.24 .26	.24 .26		
Acetic Anhydride, 100 lb cbys lb.	.21 .25	.21 .25	.21 .25		
drs, f.o.b. wks, frt allowed lb.	... .15	... ...	... ...		
Acetin, tech, drs lb.	.22 .24	.22 .24	.22 .24		
Acetone, tks, f.o.b. wks, frt allowed lb.	... .08	.08 .12	.11 .12		
drs, c-l, f.o.b. wks, frt allowed lb.	... .09	.09 .12	... .12		
Acetyl chloride, 100 lb cbys lb.	.55 .68	.55 .68	.55 .68		
ACIDS					
Abietic, kgs, bbls lb.	.06¾ .07	.06¾ .07	.06¾ .07		
Acetic, 28%, 400 lb bbls, c-l, wks 100 lbs.	... 2.45	... 2.45	2.40 2.45		
glacial, bbls, c-l, wks 100 lbs.	... 8.43	... 8.43	8.25 8.43		
glacial, USP, bbls, c-l, wks 100 lbs.	... 12.43	... 12.43	12.25 12.43		
Adipic, kgs, bbls lb.	... .72	... .72	... .72		
Anthranilic, refd, bbls ....lb.	.85 .95	.85 .95	.85 .95		
tech, bbls lb.	... .75	... .75	... .75		
Battery, cbys, delv ...100 lbs.	1.60 2.25	1.60 2.25	1.60 2.25		
Benzoic, tech, 100 lb kgs ..lb.	.40 .45	.40 .45	.40 .45		
USP, 100 lb kgs lb.	.54 .59	.54 .59	.54 .59		
Boric, tech, gran, 80 tons, bgs, delv ton *a*	... 95.00	... 95.00	80.00 95.00		
Broenner's, bbls lb.	1.20 1.25	1.20 1.25	1.20 1.25		
Butyric, 95%, cbys lb.	.53 .60	.53 .60	.53 .60		
edible, c-l, wks, cbys ...lb.	1.20 1.30	1.20 1.30	1.20 1.30		
synthetic, c-l, drs lb.	.. .22	... .22	... .22		
wks lb.	... .23	... .23	... .23		
tks, wks lb.	... .21	... .21	... .21		
Camphoric, drs lb.	... 5.25	... 5.25	... 5.25		
Chicago, bbls lb.	... 2.10	... 2.10	... 2.10		
Chlorosulfonic, 1500 lb drs, wks lb.	.03½ .05	.03½ .05	.03½ .05½		
Chromic, 99¾%, drs, delv lb.	.14¾ .16¾	.14¾ .16¾	.13¾ .16¾		
Citric, USP, crys, 230 lb bbls lb. *b*	.27 .28	.27 .29	.28 .29		
anhyd, gran, drs lb. *b*	... .30	.30 .31	... .31		
Cleve's, 250 lb bbls lb.	.52 .54	.52 .54	.52 .54		
Cresylic, 99%, straw, HB, drs, wks, frt equal ..gal.	.63 .65	.51 .65	.46 .53		
99%, straw, LB, drs, wks, frt equal gal.	.73 .75	.68 .75	.64 .68		
resin grade, drs, wks, frt equal gal.	.63 .65	.52 .65	.52 .55		
Crotonic, drs lb.	.90 1.00	.90 1.00	.90 1.00		
Formic, tech, 140 lb drs ..lb.	.11 .13	.11 .13	.11 .13		
Fumaric, bbls lb.	... .60	... .60	... .60		
Fuming, see Sulfuric (Oleum)					
Fuoric, tech, 90%, 100 lb. drs lb.	... .35	... .35	... .35		
Gallic, tech, bbls lb.	.65 .68	.65 .68	.65 .68		
USP, bbls lb.	.70 .80	.70 .80	.70 .80		
Gamma, 225 lb bbls, wks..lb.	.80 .84	.80 .84	.77 .79		
H, 225 lb. bbls, wks lb.	.50 .55	.50 .55	.50 .55		
Hydriodic, USP, 10% sol. cbys lb.	.50 .51	.50 .51	.50 .51		
Hydrobromic, 48% com 155 lb cbys, wks lb.	.45 .48	.45 .48	.45 .48		
Hydrochloric, see muriatic.					
Hydrocyanic, cyl. wks ....lb.	.80 1.30	.80 1.30	.80 1.30		
Hydrofluoric, 30%, 400 lb bbls, wks lb.	.07 .07½	.07 .07½	.07 .07½		
Hydrofluosilicic, 35%, 400 bbls, wks lb.	.11 .12	.11 .12	.11 .12		
Lactic, 22%, dark, 500 lb bbls lb.	.04½ .05	.04½ .05	.04½ .05		
22%, light refd, bbls ...lb.	.06½ .07	.06½ .07	.06½ .07		
44%, light, 500 lb bbls ..lb.	.11½ .12	.11½ .12	.11½ .12		
44%, dark, 500 lb bbls ..lb.	.09½ .10	.09½ .10	.09½ .10		
50%, water white, 500 lb bbls lb.	... .14½	... .14½	... ...		
USP X, 85%, cbys ....lb.	.45 .50	.45 .50	.45 .50		
Laurent's, 250 lb bbls ....lb.	.46 .47	.46 .47	.36 .37		
Linoleic, bbls lb.	.16 .16	.16 .16	.16 .16		
Maleic, powd, kgs lb.	.29 .32	.29 .32	.29 .32		
Malic, powd, kgs lb.	.45 .60	.45 .60	.45 .60		
Metanillic, 250 lb bbls ....lb.	.60 .65	.60 .65	.60 .65		
Mixed, tks, wks N unit	.06½ .07¼	.06½ .07¼	.06½ .07¼		
S unit	.008 .009	.008 .009	.008 .009		
Monochloracetic, tech, bbls lb.	.16 .18	.16 .18	.16 .18		
Monosulfonic, bbls lb.	1.50 1.60	1.50 1.60	1.50 1.60		
Muriatic, 18°, 120 lb cbys, c-l, wks 100 lb.	... 1.35	... 1.35	... 1.35		
tks, wks 100 lb.	... 1.00	... 1.00	... 1.00		

a Powdered boric acid $5 a ton higher in each case; USP $15 higher; *b* Powdered citric is ½c higher; kegs are in each case ½c higher than bbls.

	Current Market	1936 Low	1936 High	1935 Low	1935 High
Muriatic (cont.):					
20°, cbys, c-l, wks ..100 lb.	... 1.45	... 1.45	... 1.45		
tks, wks 100 lb.	... 1.20	... 1.20	... 1.20		
22°, c-l, cbys, wks ..100 lb.	... 1.95	... 1.95	... 1.95		
tks, wks 100 lb.	... 1.60	... 1.60	... 1.60		
CP, cbys lb.	.06½ .07⅛	.06½ .07⅛	.06½ .07⅛		
N & W, 250 lb bbls lb.	.85 .87	.85 .87	.85 .87		
Naphthenic, 240-280 s.v., drs lb.	.11 .14	.11 .14	.11 .14		
Sludges, drs lb.	.06 .10	.06 .10	... ...		
Naphthionic, tech, 250 lb bbls lb.	.60 .65	.60 .65	.60 .65		
Nitric, 36°, 135 lb cbys, c-l, wks 100 lb. *c*	... 5.00	... 5.00	... 5.00		
38°, c-l, cbys, wks..100 lb. *c*	... 5.50	... 5.50	... 5.50		
40°, cbys, c-l, wks..100 lb. *c*	... 6.00	... 6.00	... 6.00		
42°, c-l, cbys, wks..100 lb. *c*	... 6.50	... 6.50	... 6.50		
CP, cbys, delv lb.	.11½ .12½	.11½ .12½	.11½ .12½		
Oxalic, 300 lb bbls, wks, or N. Y. lb.	.11½ .12½	.11½ .12½	.11½ .12½		
Phosphoric, 50%, USP, cbys lb.	.14 .14	.14 .14	.14 .14		
50%, acid, c-l, drs, wks..lb.	.06 .08	.06 .08	.06 .08		
75%, acid, c-l, drs, wks..lb.	.09 .10½	.09 .10½	.09 .10½		
Picramic, 300 lb bbls, wks. lb.	.65 .70	.65 .70	.65 .70		
Picric, kgs, wks lb.	.30 .40	.30 .40	.30 .40		
Propionic, 98% wks, drs..lb.	... .35	... .35	... .35		
80% lb.	.15 .17½	.15 .17½	.15 .17½		
Pyrogallic, crys, kgs, wks..lb.	1.55 1.65	1.55 1.65	1.55 1.65		
Salicylic, tech, 125 lb bbls, wks lb.	... .40	... .40	... .40		
Sebacic, tech, drs, wks ....lb.	... .58	... .58	... .58		
Succinic, bbls lb.	... .75	... .75	... .75		
Sulfanilic, 250 lb bbls, wks lb.	.18 .19	.18 .19	.18 .19		
Sulfuric, 60°, tks, wks ..ton	... 11.00	... 11.00	... 11.00		
c-l, cbys, wks ....100 lb.	... 1.10	... 1.10	... 1.10		
66°, tks, wks ton	... 15.50	... 15.50	... 15.50		
c-l, cbys, wks ....100 lb.	... 1.35	... 1.35	... 1.35		
CP, cbys, wks lb.	.06½ .07½	.06½ .07½	.06½ .07½		
Fuming (Oleum) 20% tks, wks ton	... 18.50	... 18.50	... 18.50		
Tannic, tech, 300 lb bbls.. lb.	.23 .40	.23 .40	.23 .40		
Tartaric, USP, gran powd, 300 lb bbls lb.	... .24	... .24	.24 .25		
Tobias, 250 lb bbls lb.	.70 .72½	.70 .72½	.70 .80		
Trichloroacetic bottles ....lb.	2.45 2.75	2.45 2.75	2.45 2.75		
kgs lb.	... 1.75	... 1.75	... 1.75		
Tungstic, tech, bbls lb.	1.50 1.60	1.50 1.60	1.50 1.60		
Vanadic, drs, wks lb.	1.10 1.20	1.10 1.20	1.10 1.20		
Albumen, light flake, 225 lb bbls lb.	.50 .60	.50 .60	.45 .60		
dark, bbls lb.	.12 .17	.12 .17	.12 .17		
egg, edible lb.	.79 .81	.79 1.05	.85 1.05		
vegetable, edible lb.	.65 .70	.65 .70	.65 .70		
ALCOHOLS					
Alcohol, Amyl (from Pentane) tks, delv lb.	... .143	... .143	... ...		
c-l, drs, delv lb.	... .150	... .150	... ...		
lcl, drs, delv lb.	... .157	... .157	... ...		
Amyl, secondary, tks, delv lb.	... .108	... .108	... .108		
Benzyl, bottles lb.	.65 1.10	.65 1.10	.65 1.10		
Butyl, normal, tks, f.o.b. wks, frt allowed lb. *d*	... .08½	.08½ .11	.11 .12		
c-l, drs, f.o.b. wks, frt allowed lb. *d*	... .09½	.09½ .12	.12 .13		
Butyl, secondary, tks, delv lb. *d*	... .07½	.07½ .096	... .096		
c-l, drs, delv lb. *d*	... .08½	.08½ .106	... .106		
Capryl, drs, tech, wks ..lb.	... .85	... .85	... .85		
Cinnamic, bottles lb.	3.25 3.65	3.25 3.65	3.25 3.65		
Denatured, No. 5, c-l, drs, wks gal. *e*	... .40	.40 .44	.34 .49		
Western schedule, c-l, wks gal. *e*	... .48	.48 .52	.38 .52		
Denatured, No. 1, tks, wks gal. *e*	... .28	... .28	.29½ .31		
c-l, drs, wks gal. *e*	... .34	... .34	.34½ .36		
Western schedule, tks, wks gal. *e*	... .34	... .34	.32½ .35		
c-l, drs, wks gal. *e*	... .39	... .39	.37½ .40		
Diacetone, tech, tks, delv lb. *f*	... .16	... .16	... .16		
c-l, drs, delv lb. *f*	... .17	... .17	... .17		

c Yellow grades 25c per 100 lbs. less in each case; *d* Spot prices are 1c higher; *e* Anhydrous is 5c higher in each case; *f* Pure prices are 1c higher in each case; * Dealers are given 20% off this price.

ABBREVIATIONS—Anhydrous, anhyd; bags, bgs; barrels, bbls; carboys, cbys; carlots, c-l; less-than-carlots, lcl; drums, drs; kegs, kgs; powdered, powd; refined, ref'd; tanks, tks; works, f.o.b., wks.

	Current Market	1936 Low	1936 High	1935 Low	1935 High
Alcohols (continued)					
Ethyl, 190 proof, molasses, tks gal. *g*	...	4.07	4.07	4.10	4.08½ 4.10
c-l, drs gal. *g*	...	4.12	4.12	4.27	4.13½ 4.27
c-l, bbls gal. *g*	...	4.13	4.13	4.28	4.15½ 4.28
absolute, drs gal. *g*	4.54	6.08½	4.54	6.11½	4.55½ 6.11½
Furfuryl, tech, 500 lb drs lb.	...	.35	...	.35	... .35
Hexyl, secondary tks, delv lb.	...	.11½	...	.11½	... .11½
c-l, drs, delv lb.	...	.12½	...	.12½	... .12½
Normal, drs, wks lb.	3.25	3.50	3.25	3.50	3.25 3.50
Isoamyl, prim, cans, wks lb.	...	.32	...	.32	... ...
drs, lcl, delvd lb.	...	.27	...	.27	... ...
Isobutyl, refd, lcl, drs lb.	...	.10	.10	.12	.12 .60
c-l, drs lb.	...	.09½	.09½	.11½	... ...
tks lb.	...	.08½	.08½	.10½	... ...
Isopropyl, refd, c-l, drs, f.o.b. wks, frt allowed lb.	...	.55	...	.55	... .55
Prepyl, norm, 50 gal drs gal.	...	.75	...	.75	... .75
Special Solvent, tks, wks gal.	...	.27	.27	.32	... ...
Western points, tks, wks gal.	...	.35	...	.35	... ...
Aldehyde ammonia, 100 gal drs lb.	.80	.82	.80	.82	.80 .82
Alphanaphthol, crude, 300 lb bbls lb.	.60	.65	.60	.65	.60 .65
Alphanaphthylamine, 350 lb bbls lb.	.32	.34	.32	.34	.32 .34
Alum, ammonia, lump, c-l, bbls, wks 100 lb.	...	3.00	...	3.00	... 3.00
25 bbls or more, wks 100 lb.	...	3.15	...	3.15	... 3.15
less than 25 bbls, wks 100 lb.	...	3.25	...	3.25	... 3.25
Granular, c-l, bbls, wks 100 lb.	...	2.75	...	2.75	... 2.75
25 bbls or more, wks 100 lb.	...	2.90	...	2.90	... 2.90
Powd, c-l, bbls, wks 100 lb.	...	3.15	...	3.15	... 3.15
25 bbls or more, wks 100 lb.	...	3.30	...	3.30	... 3.30
Chrome, bbls 100 lb.	7.00	7.25	7.00	7.25	7.00 7.25
Potash, lump, c-l, bbls, wks 100 lb.	...	3.25	...	3.25	... 3.25
25 bbls or more, wks 100 lb.	...	3.40	...	3.40	... 3.40
Granular, c-l, bbls, wks 100 lb.	...	3.40	...	3.40	... 3.00
25 bbls or more, bbls, wks 100 lb.	...	3.00	...	3.00	... 3.15
Powd, c-l, bbls, wks 100 lb.	...	3.40	...	3.40	... 3.40
25 bbls or more, wks 100 lb.	...	3.55	...	3.55	... **3.55**
Soda, bbls, wks 100 lb.	4.00	4.15	4.00	4.15	4.00 4.15
Aluminum metal, c-l, NY 100 lb.	19.00	20.00	19.00	20.00	19.00 23.30
Acetate, CP, 20%, bbls lb.	.09	.10	.09	.10	.09 .10
Chloride anhyd, 99%, wks lb.	.07	.12	.07	.12	.07 .12
93%, wks lb.	.05	.08	.05	.08	.05 .08
Crystals, c-l, drs, wks lb.	.06½	.07	.06½	.07	.06½ .07
Solution, drs, wks lb.	.03	.03½	.03	.03½	.03 .03½
Hydrate, 96%, light, 90 lb bbls, delv lb.	.13	.15	.13	.15	.13 .15
heavy, bbls, wks lb.	.04	.04½	.04	.04½	.04 **.04½**
Oleate, drs lb.	...	.15¾	...	.15¾	... .15¾
Palmitate, bbls lb.	.21	.22	.21	.22	.20 .22
Resinate, pp., bbls lb.	...	.15	...	.15	... .15
Stearate, 100 lb bbls lb.	.18	.20	.18	.20	.17 .20
Sulfate, com, c-l, bgs, wks 100 lb.	...	1.35	...	1.35	... 1.35
c-l, bbls, wks 100 lb.	...	1.55	...	1.55	... 1.55
Sulfate, iron-free, c-l, bgs, wks 100 lb.	...	1.90	...	1.90	... 1.90
c-l, bbls, wks 100 lb.	...	2.05	...	2.05	... 2.05
Aminoazobenzene, 110 lb kgs lb.	...	1.15	...	1.15	... 1.15
Ammonia anhyd com, tks lb.	.04½	.05½	.04½	.05½	.04½ .05½
Ammonia anhyd, 100 lb cyl lb.	.15¼	.21½	.15¼	.21½	.15¼ .21½
26°, 800 lb drs, delv lb.	.02½	.03	.02½	.03	.02½ .03
Aqua 26°, tks, NH cont.	...	.05	...	.05	... .05
tk wagon lb.	...	.024	...	.024	... .024
Ammonium Acetate, kgs lb.	.26	.33	.26	.33	.26 .33
Bicarbonate, bbls, f.o.b. plant 100 lb.	5.15	5.71	5.15	5.71	5.15 5.71
Bifluoride, 300 lb bbls lb.	.15	.17	.15	.17	.15 .17
carbonate, tech, 500 lb bbls lb.	.08	.12	.08	.12	.08 .12
Chloride, White, 100 lb bbls, wks 100 lb.	4.45	4.90	4.45	4.90	4.45 4.90
Gray, 250 lb bbls, wks lb.	5.00	5.75	5.00	5.75	5.00 5.75
Lump, 500 lbs cks spot lb.	.10½	.11	.10½	.11	.10½ .11
Lactate, 500 lb bbls lb.	.15	.16	.15	.16	.15 .16
Linoleate lb.	.11	.12	.11	.12	.11 .12
Nitrate, tech, cks lb.	.04	.05	.04	.05	.04 .05
Oleate, drs lb.	...	.10	...	.10	... **.10**
Oxalate, neut, cryst, powd, bbls lb.	.26	.27	.26	.27	.26 .27
pure, cryst, bbls, kgs lb.	.27	.28	.27	.28	.27 .28
Perchlorate, kgs lb.	...	.16	...	.16	... .16
Persulfate, 112 lb kgs lb.	.22½	.25	.22½	.25	.22½ .25
Phosphate, dibasic tech, powd, 325 lb bbls lb.	.07½	.10	.07½	.10	.08 .10
Sulfate, dom, f.o.b., bulk ton	24.00	26.00	22.00	26.00	20.00 24.00
200 lb bgs ton	...	nom.	...	nom.	25.50 25.80
100 lb bgs lb.	...	nom.	...	nom.	26.00 26.50
Sulfocyanide, kgs lb.	...	.55	...	.55	... .50
Amyl Acetate (from pentane) tks, delv lb.	...	.13½	...	.13½	... .13½
tech, drs, delv lb.	.142	.149	.142	.149	.142 .149
secondary, tks, delv lb.	...	.108	...	.108	... .108
c-l, drs, delv lb.	.118	.123	.118	.123	.118 .123
Amyl Chloride, norm drs, wks lb.	.56	.68	.56	.68	.56 .68
Chloride, mixed, drs, wks lb.	.07	.077	.07	.077	**.07** **.077**
tks, wks lb.	...	.06	...	.06	... .06
Mercaptan, drs, wks lb.	...	1.10	...	1.10	... 1.10

g Grain alcohol 20c a gal. higher in each case.

	Current Market	1936 Low	1936 High	1935 Low	1935 High
Amylene, drs, wks lb.	.102	.11	.102	.11	.102 .11
tks, wks lb.	...	.09	...	.09	... .09
Aniline Oil, 960 lb drs and tks lb.	.15	.17½	.15	.17½	.15 .17½
Annatto fine lb.	.34	.37	.34	.37	.34 .37
Anthracene, 80% lb.	...	.75	...	.75	... .75
40% lb.	...	.18	...	.18	... .18
Anthraquinone, sublimed, 125 lb bbls lb.	.50	.52	.50	.52	.50 .52
Antimony metal slabs, ton lots lb.	.12	.12⅝	.12	.13½	.12½ .16
Needle, powd, bbls lb.	.11½	.12	.11	.12½	.09 .13½
Butter of, see Chloride.					
Chloride, soln cbys lb.	.13	.17	.13	.17	**.13** .17
Oxide, 500 lb bbls lb.	.13¼	.13½	.13¼	.14	.10¼ .15
Salt, 63% to 65%, tins lb.	.22	.24	.22	.24	.22 .24
Sulfuret, golden, bbls lb.	.22	.23	.22	.23	.19 .23
Vermilion, bbls lb.	.35	.42	.35	.42	.35 .42
Archil, conc, 600 lb bbls lb.	.21	.27	.21	.27	.21 .27
Double, 600 lb bbls lb.	.18	.20	.18	.20	.18 .20
Triple, 600 lb bbls lb.	.18	.20	.18	.20	.18 .20
Argols, 80%, casks lb.	**.14**	**.15**	.14	.15	**.15** .16
Crude, 30%, casks lb.	.07	.08	.07	.08	**.07** .08
Aroclors, wks lb.	.18	.30	.18	.30	**.18** .30
Arrowroot, bbl lb.	.08¾	.09¾	.08¾	.09¾	**.08¾** .09¾
Arsenic, Red, 224 lb cs kgs lb.	...	.15¾	...	.15¾	... .15¾
White, 112 lb kgs lb.	.03½	.04½	.03½	.04½	.03½ .04½
Metal lb.	.40	.42	.40	.42	**.40** .42
Asbestine, c-l, wks ton	13.00	15.00	13.00	15.00	**13.00** 15.00
Barium Carbonate precip, 200 lb bgs, wks ton	56.50	61.00	56.50	61.00	**56.50** 61.00
Nat (witherite) 90% gr, c-l, wks, bgs ton	42.00	45.00	42.00	45.00	**42.00** 45.00
Chlorate, 112 lb kgs NY lb.	.15½	.17½	.15½	.17½	.14 .17½
Chloride, 600 lb bbl, wks ton	72.00	74.00	72.00	74.00	**72.00** 74.00
Dioxide, 88%, 690 lb drs lb.	.11	.12	.11	.12	.11 .12
Hydrate, 500 lb bbls lb.	.05½	.06	.05½	.06	.05½ .06
Nitrate, 700 lb cks lb.	...	.08¼	...	.08¼	... .08¼
Barytes, floated, 350 lb bbls wks ton	23.65	31.15	23.65	31.15	23.00 31.15
Bauxite, bulk, mines ton	7.00	10.00	7.00	10.00	7.00 10.00
Bentonite, c-l, No. 1, bgs, wks ton	...	16.50	...	16.50	16.50 18.00
No. 2 ton	...	11.00	...	11.00	11.00 12.50
Benzaldehyde, tech, 945 lb drs, wks lb.	.60	.62	.60	.62	.60 .62
Benzene (Benzol), 90%, Ind, 8000 gal tks, frt allowed gal.	...	.18	...	.18	**.15** .18
90% c-l, drs gal.	...	.23	...	.23	.23 .24
Ind Pure, tks, frt allowed gal.	...	.18	...	.18	.15 .18
Benzidine Base, dry, 250 lb bbls lb.	.72	.74	.72	.74	.67 .69
Benzoyl Chloride, 500 lb drs lb.	.40	.45	.40	.45	.40 .45
Benzyl Chloride, tech, drs lb.	.30	.40	.30	.40	.30 .40
Beta-Naphthol, 250 lb bbl, wks lb.	.24	.27	.24	.27	... .24
Naphthylamine, sublimed, 200 lb bbls lb.	1.25	1.35	1.25	1.35	1.25 1.35
Tech, 200 lb bbls lb.	.53	.55	.53	.55	.53 .55
Bismuth metal	1.00	1.10	1.00	1.10	.90 1.20
Chloride, boxes lb.	3.20	3.25	3.20	3.25	3.20 3.25
Hydroxide, boxes lb.	3.15	3.20	3.15	3.20	3.15 3.20
Oxychloride, boxes lb.	2.95	3.00	2.95	3.00	**2.95** 3.00
Subbenzoate, boxes lb.	3.25	3.30	3.25	3.30	**3.25** 3.30
Subcarbonate, kgs lb.	1.40	1.45	1.40	1.45	**1.55** 1.70
Trioxide, powd, boxes lb.	3.45	3.50	3.45	3.50	**3.45** 3.50
Subnitrate	1.30	1.35	1.30	1.35	**1.30** 1.45
Blackstrap, cane (see Molasses, Blackstrap).					
Blanc Fixe, 400 lb bbls, wks ton *h*	42.50	70.00	42.50	70.00	**42.50** 70.00
Bleaching Powder, 800 lb drs, c-l, wks, contract 100 lb.	...	2.00	...	2.00	**1.90** 2.00
lcl, drs, wks lb.	2.25	3.60	2.25	3.60	**2.15** 3.60
Blood, dried, f.o.b., NY unit	...	2.50	2.50	3.20	**2.50** 3.25
Chicago, high grade unit	2.90	3.00	2.90	3.50	**2.50** 3.75
Imported shipt unit	2.60	2.65	2.60	3.05	2.75 3.30
Blues, Bronze Chinese Milori Prussian Soluble lb.	.37	.38½	.37	.38½	.36½ .38
Ultramarine,* dry, wks, bbls lb.	...	.10	...	.10	... ...
Regular grade, group 1 lb.	...	.15	...	.15	... ...
Special, group 1 lb.	...	.18	...	.18	... ...
Pulp, No. 1 lb.	...	.26	...	.26	... ...
Bone, 4½ + 50% raw, Chicago ton	20.00	22.00	20.00	22.00	**19.00** 22.00
Bone Ash, 100 lb kgs lb.	.06	.07	.06	.07	.06 .07
Black, 200 lb bbls lb.	.05½	.08¼	.05½	.08¼	**.05½** .08¼
Meal, 3% & 50%, imp ton	...	23.00	23.00	23.25	**22.75** 24.00
Domestic, bgs, Chicago ton	17.00	19.00	17.00	20.00	**16.00** 21.00
Borax, tech, gran, 80 ton lots, sacks, delv ton *i*	...	40.00	...	40.00	**36.00** 40.00
bbls, delv ton *i*	...	50.00	...	50.00	**46.00** 50.00
c-l, sacks, delv ton *i*	...	44.00	...	44.00	**40.00** 44.00
c-l, bbls, delv ton *i*	...	54.00	...	54.00	**50.00** 54.00
Tech, powd, 80 ton lots, sacks ton *i*	...	45.00	...	45.00	**41.00** 45.00
bbls, delv ton *i*	...	56.00	...	56.00	**51.00** 56.00
c-l, sacks, delv ton *i*	...	49.00	...	49.00	**45.00** 49.00
c-l, bbls, delv ton *i*	...	59.00	...	59.00	**55.00** 59.00
Bordeaux Mixture, jobbers, East, c-l, tins, drs, cases lb.	.08	.16	.08	.16	.08 .16
Jobbers, West, c-l lb.	.08	.10	.08	.10	.08 .10
Dealers, East, c-l lb.	.08½	.16½	.08½	.16½	.08½ .16½
Dealers, West, c-l lb.	.09	.11	.09	.11	**.09** .11

h Lowest price is for pulp, highest for high grade precipitated; *i* Crystals $6 per ton higher; USP, $15 higher in each case; * Freight is equalized in each case with nearest producing point.

HARSHAW INDUSTRIAL CHEMICALS

A PARTIAL LIST OF HARSHAW CHEMICALS

Aluminum Oleate
Aluminum Palmitate
Aluminum Stearate
Ammonium Bifluoride
Ammonium Chloride
Ammonium Silico Fluoride
Antimony Oxide
Cadmium Oxide
Cadmium Sulphide
Calcium Linoleate
Calcium Stearate
Carbon Tetrachloride
Ceramic Colors
Chromic Acid
Cobalt Acetate
Cobalt Carbonate
Cobalt Driers
Cobalt Sulphate
Copper Nitrate
Copper Oleate
Copper Oxide
Cream of Tartar
Di Sodium Phosphate
Glycerine
Hydrofluoric Acid
Hydrofluosilicic Acid
Lead Acetate
Lead Driers
Lead Oleate
Magnesium Silico Fluoride
Magnesium Sulphate
Manganese Carbonate
Manganese Driers
Manganese Oxide
Manganese Sulphate
Nickel Salts
Potassium Bichromate
Potassium Carbonate
Potassium Nitrate
Powdered Metals
Rochelle Salts
Selenium
Silver Salts
Sodium Antimonate
Sodium Bichromate
Sodium Cyanide
Sodium Fluoride
Sodium Metasilicate
Sodium Silicate
Sodium Silico Fluoride
Sodium Stannate
Tartaric Acid
Titanium Oxide
Tri Sodium Phosphate
Uranium Oxide
Zinc Ammonium Chloride
Zinc Carbonate
Zinc Chloride
Zinc Cyanide
Zinc Linoleate
Zinc Stearate
Zinc Tungate

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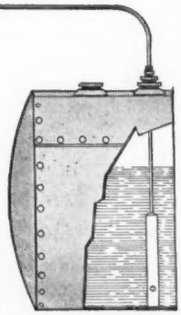


Bromine
Chromium Fluoride

Prices

	Current Market	1936 Low	1936 High	1935 Low	1935 High
Bromine, cases .....lb.	.30	.30	.43	.30	.43
Bronze, Al, pwd, 300 lb drs lb.	.80	.80	1.50	.80	1.50
Gold, blk .....lb.	.40	.40	.55	.40	.55
Butanes, com 16-32° group 3 tks .....lb.	...	...	.04	...	.04
Butyl, Acetate, norm drs, frt allowed .....lb.	.09½	.09½	.12½	.12	.13½
tks, frt allowed .....lb.	...	.08½	.11	.11	.13
Secondary, tks, frt allowed .....lb.	...	.07½	.096	...	.096
drs, frt, allowed .....lb.	.08½	.106	.111	.106	.111
Aldehyde, 50 gal drs, wks .....lb.	.19	.19	.21	.19	.21
Carbinol, norm drs, wks lb.	.60	.60	.75	.60	.75
Lactate, drs .....lb.	.22½	.22½	.23½	.22½	.23½
Propionate, drs .....lb.	.18	.18	.18½	.18	.18½
tks, delv .....lb.	...	...	.17	...	.17
Stearate, 50 gal drs ....lb.	...	...	.26	...	.26
Tartrate, drs .....lb.	.55	.55	.60	.55	.60
Butyraldehyde, drs, lcl, wks lb.	...	...	...	...	...
Cadmium, Sulfide, boxes...lb.	1.00	1.00	1.10	.75	.85
Cadmium Metal .....lb.	...	.85	1.05	.55	.90
Calcium, Acetate, 150 lb bgs c-l, delv .....100 lb.	...	...	2.10	2.00	2.10
Arsenate, jobbers, East of Rocky Mts, drs .....lb.	.06	.06	.06½	.06	.06½
dealers, drs .....lb.	.06¼	.06¼	.07¼	.06¼	.07¼
South, jobbers, drs .....lb.	.06	.06	.06½	.06	.06½
dealers, drs .....lb.	.06½	.06¼	.06¾	.06¼	.06¾
Carbide, drs .....lb.	.05	.05	.06	.05	.06
Carbonate, tech, 100 lb bgs c-l .....lb.	1.00	1.00	1.00	1.00	1.00
Chloride, flake, 375 lb drs, c-l, wks .....ton	...	...	19.50	...	19.50
Solid, 650 lb drs, c-l, f.o.b. wks .....ton	...	...	17.50	...	17.50
Ferrocyanide, 350 lb bbls wks .....lb.	...	...	.17	...	.17
Gluconate, tech, 125 lb bbls .....lb.	...	...	.28	...	.28
Nitrate, 100 lb bgs ....ton	...	...	26.50	...	26.50
Palmitate, bbls .....lb.	.21	.21	.22	.20	.22
Peroxide, 100 lb drs ....lb.	...	...	1.25	...	1.25
Phosphate, tech, 450 lb bbls .....lb.	.07½	.07½	.08	.07½	.08
Resinate, precip, bbls ...lb.	.13	.13	.14	.13	.14
Stearate, 100 lb bbls ...lb.	.18	.18	.20	.17	.20
Camphor, slabs .....lb.	.55	.55	.56	.49	.57
Powder .....lb.	.55	.55	.56	.50	.57
Camwood, Bk, ground bbls lb.	.16	.16	.18	.16	.18
Carbon, Decolorizing, drs c-l .....lb.	.08	.08	.15	.08	.15
Black, c-l, bgs, delv, price varying with zone ....lb.	.0445	.0445	.0535	.0445	.0535
lcl, bgs, delv, all zones lb.	...	...	.07	...	.07
cartons, delv .....lb.	...	...	.07¾	...	.07¾
cases, delv .....lb.	...	...	.08¼	...	.08¼
Bisulfide, 500 lb drs ....lb.	.05¼	.05¼	.08	.05¼	.08
Dioxide, Liq 20-25 lb cyl lb.	.06	.06	.08	.06	.08
Tetrachloride, 1400 lb drs, delv .....lb.	.05¼	.05¼	.06	.05¼	.06
Casein, Standard, Dom, grd lb.	.14½	.14½	.16¾	.09½	.16¾
80-100 mesh, c-l, bgs....lb.	.15	.15	.17¼	.10	.17¼
Castor Pomace, 5½ NH_3, c-l, bgs, wks .....ton	...	15.00	15.50	16.00	18.50
Imported, ship, bgs ....ton	...	17.50	18.00	17.25	20.00
Celluloid, Scraps, ivory cs lb.	.17	.17	.18	.17	.18
Transparent, cs .....lb.	...	...	.20	...	.20
Cellulose, Acetate, 50 lb kgs .....lb.	.55	.55	.60	.55	.60
Chalk, dropped, 175 lb bbls lb.	.03	.03	.03¾	.03	.03¾
Precip, heavy, 560 lb cks lb.	.03	.03	.04	.03	.04
Light, 250 lb cks .....lb.	.03	.03	.04	.03	.04
Charcoal, Hardwood, lump, blk, wks .....bu.	...	...	.15	...	.15
Willow, powd, 100 lb bbl, wks .....lb.	.06	.06	.06¼	.06	.06¼
bgs, delv* .....ton	24.40	24.40	25.40	22.40	30.00
Chestnut, clarified bbls, wks lb.	...	...	.01⅞	...	.01⅞
25%, tks, wks .....lb.	...	...	.01½	...	.01½
Pwd, 60%, 100 lb bgs. wks .....lb.	...	...	.04⅞	...	.04⅞
China Clay, c-l, blk mines ton	...	7.00	...	7.00	...
Powdered, bbls .....lb.	.01	.01	.02	.01	.02
Pulverized, bbls, wks ..ton	10.00	10.00	12.00	10.00	12.00
Imported, lump, blk ...ton	15.00	15.00	25.00	15.00	25.00
Chlorine, cyls, lcl, wks, contract .....lb.	.07½	.07½	.08½	.07½	.08½
cyls, c-l, contract ...lb. *j*	...	...	.05½	...	.05½
Liq, tk, wks, contract 100 lb.	...	...	2.15	2.00	2.15
Multi, c-l, cyls, wks, cont .....lb.	2.30	2.30	2.55	2.30	2.40
Chloroacetophenone, tins, wks .....lb.	...	...	2.00	...	2.00
Chlorobenzene, Mono, 100 lb drs, lcl, wks .....lb.	.06	.06	.07½	.06	.07½
Chloroform, tech, 1000 lb drs .....lb.	.20	.20	.21	.20	.21
USP, 25 lb tins .....lb.	.30	.30	.31	.30	.31
Chloropicrin; comml cyls..lb.	.85	.85	.90	.85	.90
Chrome, Green, CP .....lb.	.17	.17	.18½	.17	.30
Yellow .....lb.	.11	.11	.12	.11	.16
Chromium, Acetate, 8% Chrome, bbls .....lb.	.06	.06	.08	.05	.05¼
20° soln, 400 lb bbls ..lb.	...	...	.05½	...	.05½
Fluoride, powd, 400 lb bbl .....lb.	.27	.27	.28	.27	.28

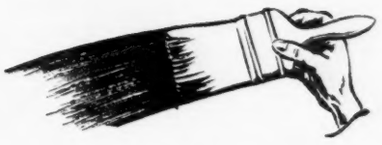
j A delivered price; * Depends upon point of delivery.

Current

Coal Tar

		Current Market	1936 Low	1936 High	1935 Low	1935 High
Coal tar, bbls	bbl.	7.25	9.00	7.25	9.00	7.25	9.00
Cobalt Acetate, bbls	lb.	...	.58	.58	.60	...	.60
Carbonate tech, bbls	lb.	1.35	1.40	1.35	1.40	1.35	1.40
Hydrate, bbls	lb.	1.66	1.76	1.66	1.76	1.66	1.76
Linoleate, paste, bbls	lb.	..	.30	...	.30	...	.30
Resinate, fused, bbls	lb.	...	.12½	...	.12½	...	.12½
Precipitated, bbls	lb.	...	.32	...	.32	...	.32
Oxide, black, bgs	lb.	1.41	1.51	1.29	1.49	1.25	1.49
Cochineal, gray or bk bgs.	lb.	.32	.36	.32	.36	.32	.39
Teneriffe silver, bgs	lb.	.33	.37	.33	.37	.33	.40
Copper, metal, electrol 100 lb.		...	9.50	...	9.50	8.00	9.25
Carbonate, 400 lb bbls	lb.	...	.08¼	...	.08¼	...	.08¼
52-54% bbls	lb.	.14½	.16¼	.14½	.16¼	.14½	.16¼
Chloride, 250 lb bbls	lb.	.17	.18	.17	.18	.17	.18
Cyanide, 100 lb drs	lb.	.37	.38	.37	.38	.37	.38
Oleate, precip, bbls	lb.	...	.20	...	.20	...	.20
Oxide, red, 100 lb bbls.	lb.	.14	.15	.14	.15	.15	.17
black bbls, wks	lb.	.14½	.15	.14½	.15	.14	.16½
Resinate, precip, bbls	lb.	.18	.19	.18	.19	.18	.19
Stearate, precip, bbls	lb.	.35	.40	.35	.40	.35	.40
Sub-acetate verdigris, 400 lb bbls	lb.	.18	.19	.18	.19	.18	.19
Sulfate, bbls, c-l, wks 100 lb.		...	4.00	3.85	4.00	...	3.85
Copperas, crys and sugar bulk c-l, wks, bgs	ton	13.00	14.00	13.00	14.00	12.00	14.00
Corn Syrup, 42 deg, bbls 100 lb.		...	3.25	3.05	3.25	3.18	3.63
43 deg, bbls	100 lb.	...	3.30	3.10	3.30	3.23	3.68
Corn Sugar, tanners, bbls	100 lb.	...	3.28	3.08	3.28	3.46	3.66
Cotton, Soluble, wet, 100 lb bbls	lb.	.40	.42	.40	.42	.40	.42
Cream Tartar, USP, powd & gran, 300 lb bbls	lb.	...	.16¾	...	.16¾	.16¼	.17¼
Creosote, USP, 42 lb cbys	lb.	.45	.47	.45	.47	.45	.47
Oil, Grade 1, tks	gal.	.12½	.13½	.12½	.13½	.11½	.13½
Grade 2	gal.	.109	.12	.109	.12	.10½	.12
Cresol, USP, drs	lb.	.10	.10½	.10	.10½	.10	.11½
Crotonaldehyde, 98%, drs, wks	lb.	.26	.30	.26	.30	.32	.36
Cudbear, English	lb.	.19	.25	.19	.25	.19	.25
Cutch, Philippine, 100 lb bale	lb.	.04	.04¾	.04	.04¾	.03½	.04¾
Cyanamid, bgs, c-l, frt allowed Ammonia unit		...	1.07½	...	1.07½	...	1.07½
Dextrin, corn, 140 lb bgs f.o.b., Chicago	100 lb.	3.65	3.85	3.45	3.85	3.60	4.15
British Gum, bgs	100 lb.	3.90	4.20	3.70	4.20	3.85	4.50
White, 140 lb bgs	100 lb.	3.60	3.80	3.40	3.80	3.50	4.10
Potato, Yellow, 220 lb bgs	lb.	.07¾	.08¾	.07¾	.08¾	.07¾	.08¾
White, 220 lb bgs, lcl	lb.	.08	.09	.08	.09	.08	.09
Tapioca, 200 bgs, lcl	lb.	...	.08	...	.08	.08	.08¾
Diamylamine, drs, wks	lb.	...	1.00	...	1.00	...	1.00
Diamylene, drs, wks	lb.	.095	.102	.095	.102	.095	.102
tks, wks	lb.	...	.08½	...	.08½	...	.08½
Diamylether, wks, drs	lb.	.085	.092	.085	.092	.085	.092
tks, wks	lb.	...	.075	...	.075	...	.075
Diamylphthalate, drs wks gal.		.18	.19½	.18	.19½	.18	.20½
Diamyl Sulfide, drs, wks	lb.	...	1.10	...	1.10	...	1.10
Dianisidine, bbls	lb.	2.25	2.45	2.25	2.45	2.25	2.45
Dibutyl Ether, drs, wks, lcl	lb.	...	.22	...	...	...	...
Dibutylphthalate, drs, wks, frt allowed	lb.	...	.18	.18	.21	.20	.23
Dibutyltartrate, 50 gal drs	lb.	.35	.40	.35	.40	.35	.40
Dichlorethylene, drs	gal.	.29	...	.29	...	.29	...
Dichloroethylether, 50 gal drs, wks	lb.	.16	.17	.16	.17	.16	.17
tks, wks	lb.	...	.15	...	.15	...	.15
Dichloromethane, drs, wks	lb.	...	.23	...	.23	.15	.23
Dichloropentanes, drs, wks	lb.	.032	.040	.032	.040	.032	.040
tks, wks	lb.	...	.02½	...	.02½	...	.02½
Diethanolamine, tks, wks.	lb.	...	.30	...	.30	...	...
Diethylamine, 400 lb drs	lb.	2.75	3.00	2.75	3.00	2.75	3.00
Diethyl Carbinol, drs	lb.	.60	.75	.60	.75	.60	.75
Diethylcarbonate, com drs	lb.	.31⅜	.35	.31⅜	.35	.31⅜	.35
90% grade, drs	lb.	...	.25	...	.25	...	.25
Diethylaniline, 850 lb drs.	lb.	.52	.55	.52	.55	.52	.55
Diethylorthotoluidin, drs	lb.	.64	.67	.64	.67	.64	.67
Diethyl phthalate, 1000 lb drs	lb.	.18½	.19	.18½	.19	.18½	.27
Diethylsulfate, tech, drs, wks, lcl	lb.	...	.20	...	.20	...	...
Diethyleneglycol, drs	lb.	.16½	.17½	.15½	.17½	.15½	.17½
Mono ethyl ethers, drs.	lb.	.16	.17	.15	.17	.15	.17
tks, wks	lb.	...	.15	...	.15	...	.15
Mono butyl ether, drs	lb.	...	.26	...	.26	...	.26
Diethylene oxide, 50 gal drs, wks	lb.	.20	.24	.20	.24	.20	.27
Diglycol Oleate, bbls	lb.	...	.24	...	.24	.16	.24
Dimethylamine, 400 lb drs, pure 25 & 40% sol 100% basis	lb.	...	.95	...	.95	...	.95
Dimethylaniline, 340 lb drs	lb.	.29	.30	.29	.30	.29	.30
Dimethyl Ethyl Carbinol, drs	lb.	.60	.75	.60	.75	.60	.75
Dimethyl phthalate, drs, wks, frt allowed	lb.	.19½	.20	.19½	.21½	.20½	.24½
Dimethysulfate, 100 lb drs	lb.	.45	.50	.45	.50	.45	.50
Dinitrobenzene, 400 lb bbls	lb. *k*	.17	.19½	.17	.19½	.17	.19½
Dinitrochlorobenzene, 400 lb bbls	lb.	.14	.15½	.14	.15½	.14	.15½
Dinitronaphthalene, 350 lb bbls	lb.	.34	.37	.34	.37	.34	.37
Dinitrophenol, 350 lb bbls	lb.	.23	.24	.23	.24	.23	.24
Dinitrotoluene, 300 lb bbls	lb.	.15½	.16½	.15½	.16½	.15½	.16½
Diphenyl	lb.	.15	.25	.15	.25	.15	.25
Diphenylamine	lb.	.31	.32	.31	.32	.31	.32
Diphenylguanidine, 100 lb bbl	lb.	.35	.37	.35	.37	.36	.37

k Higher price is for purified material.



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HCl	HNO_3	H_2SO_4	H_2SO_4
$C_2O_4H_2.2H_2O$	H_2SO_4	KOH	KOH
H_2SO_4	KOH	NaOH	NaOH
$(NH_4)CNS$	NaOH		
I			
$K_2Cr_2O_7$			
$KBrO_3$			
KOH			
$KMnO_4$			
$AgNO_3$			
Na_2HAsO_3			
$NaBrO_3$			
Na_2CO_3			
NaCl			
NaOH			
$C_2O_4Na_2$			
$Na_2S_2O_3+5H_2O$			

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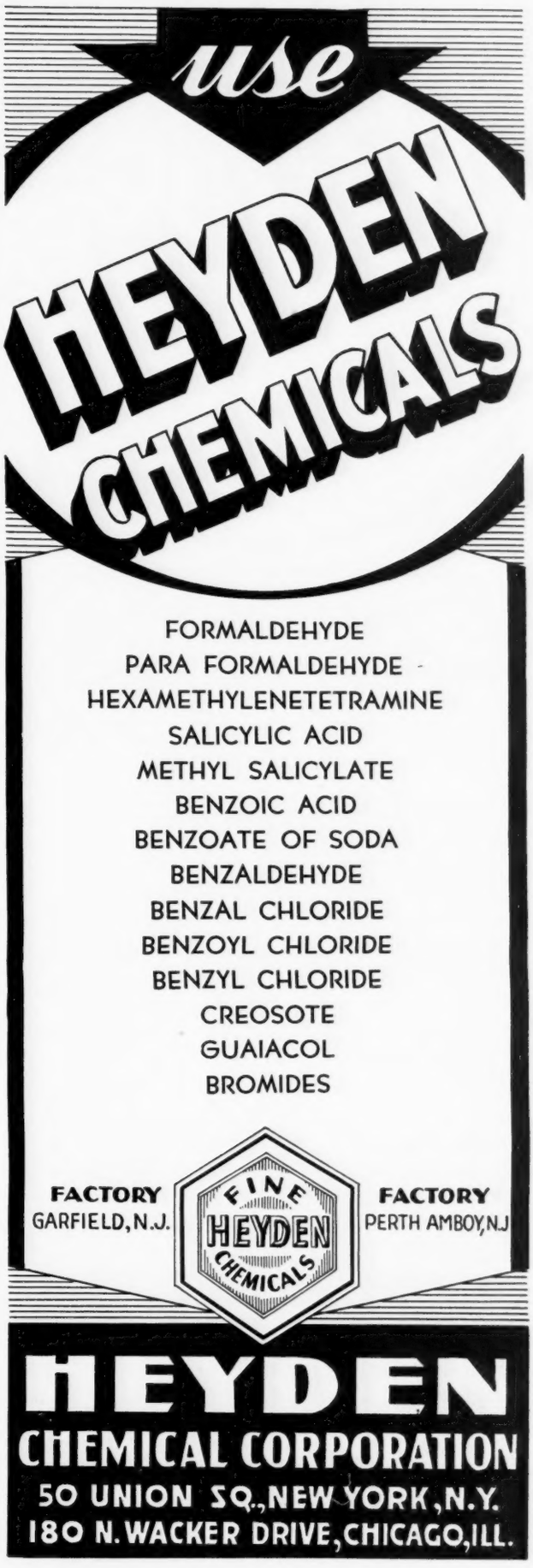
Dip Oil
Glycerin — Prices

	Current Market	1936 Low	1936 High	1935 Low	1935 High
Dip Oil, see Tar Acid Oil.					
Divi Divi pods, bgs shipmt ton	42.00	45.00	34.00	45.00	36.00	40.00
Extract .....lb.	.05	.05½	.05	.05½	.05	.05½
Egg Yolk, dom., 200 lb cases .....lb.	...	.68	.63	.68	.46	.63
Imported .....lb.	.49	.51	.49	.56	...	...
Epsom Salt, tech, 300 lb bbls c-l NY .....100 lb.	1.80	2.00	1.80	2.00	1.80	2.25
USP, c-l, bbls .....100 lb.	...	2.00	...	2.00	2.00	2.25
Ether, USP anaesthesia 55 lb drs .....lb.	.22	.23	.22	.23	.22	.23
(Conc) .....lb.	.09	.10	.09	.10	.09	.10
Ether, Isopropyl 50 gal drs lb.	.07	.08	.07	.08	.07	.08
tks, frt allowed .....lb.	...	.06	...	.06	...	.06
Nitrous, conc, bottles ...lb.	.75	.77	.75	.77	.75	.77
Synthetic, wks, drs ....lb.	.08	.09	.08	.09	.08	.09
Ethyl Acetate, 85% Ester tks, frt alld .....lb.	...	.06	.06	.08	.07½	.08
drs, frt alld .....lb.	.07	.07½	.07½	.09	.08½	.09
Anhydrous, tks, frt alld..lb.	...	.07	.07	.08½	...	.08½
drs, frt alld .....lb.	.08	.08½	.08	.10	.09½	.10
Acetoacetate, 110 gal drs lb.	...	.37	.37	.68	.65	.68
Benzylaniline, 300 lb drs lb.	.88	.90	.88	.90	.88	.90
Bromide, tech, drs .... lb.	.50	.55	.50	.55	.50	.55
Chloride, 200 lb drs ....lb.	.22	.24	.22	.24	.22	.24
Chlorocarbonate cbys ...lb.	...	.30	...	.30	...	.30
Crotonate, drs .....lb.	1.00	1.25	1.00	1.25	1.00	1.25
Ether, Absolute, 50 gal drs .....lb.	.50	.52	.50	.52	.50	.52
Lactate, drs, wks .....lb.	.25	.29	.25	.29	.25	.29
Methyl Ketone, 50 gal drs, frt allowed .....lb.	.07½	.08	.07½	.09	.08½	.09
tks, frt allowed .....lb.	...	.06½	.06½	.07½	...	.07½
Oxalate, drs, wks .....lb.	.37½	.55	.37½	.55	.37½	.55
Oxybutyrate, 50 gal drs, wks .....lb.	.30	.30½	.30	.30½	.30	.30½
Ethylene Dibromide, 60 lb drs .....lb.	.65	.70	.65	.70	.65	.70
Chlorhydrin, 40%, 10 gal cbys chloro, cont .....lb.	.75	.85	.75	.85	.75	.85
Anhydrous .....lb.	...	.75	...	.75	...	...
Dichloride, 50 gal drs, wks lb.	.0545	.0994	.0545	.0994	.0545	.0994
Glycol, 50 gal drs, wks lb.	.17	.21	.17	.21	.17	.28
tks, wks .....lb.	...	.16	...	.16	...	...
Mono Butyl Ether, drs, wks .....lb.	.20	.21	.20	.21	.20	.21
tks, wks .....lb.	...	.19	...	.19	...	.19
Mono Ethyl Ether, drs, wks .....lb.	.16	.17	.16	.17	.16	.17
tks, wks .....lb.	...	.15	...	.15	...	.15
Mono Ethyl Ether Acetate, drs, wks .....lb.	...	.14	.14	.18½	.17½	.18½
tks, wks .....lb.	...	.13	.13	.16½	...	.16½
Mono, Methyl Ether, drs wks .....lb.	.19	.23	.19	.23	.19	.23
tks, wks .....lb.	...	.18	...	.18	...	...
Stearate .....lb.	.18	.18	.18	.18	.18	.18
Oxide, cyl .....lb.	.50	.55	.50	.60	.55	.75
Ethylidenaniline .....lb.	.45	.47½	.45	.47½	.45	.47½
Feldspar, blk pottery ....ton	..	14.50	...	14.50	...	14.50
Powd, blk, wks .....ton	14.00	14.50	14.00	14.50	14.00	14.50
Ferric Chloride, tech, crys, 475 lb bbls .....lb.	.05	.07½	.05	.07½	.05	.07½
sol, 42° cbys .....lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
Fish Scrap, dried, unground, wks .....unit *l*	...	2.50	...	2.50	2.25	2.90
Acid, Bulk, 6 & 3%, delv Norfolk & Baltimore basis .....unit *m*	...	2.25	...	2.25	2.00	2.35
Fluorspar, 98%, bgs .....lb.	30.00	35.50	30.00	35.50	28.00	35.50
Formaldehyde, USP, 400 lb bbls, wks .....lb.	.06	.07	.06	.07	.06	.07
Fossil Flour .....lb.	.02½	.04	.02½	.04	.02½	.04
Fullers Earth, blk, mines .....ton	6.50	15.00	6.50	15.00	6.50	15.00
Imp powd, c-l, bgs ....ton	23.00	30.00	23.00	30.00	23.00	30.00
Furfural (tech) drs, wks..lb.	.10	.15	.10	.15	.10	.15
Furfuramide (tech) 100 lb drs .....lb.	...	.30	...	.30	...	.30
Fusel Oil, 10% impurities lb.	.16	.18	.16	.18	.16	.18
Fustic, chips .....lb.	.04	.05	.04	.05	.04	.05
Crystals, 100 lb boxes...lb.	.20	.23	.20	.23	.20	.23
Liquid 50°, 600 lb bbls..lb.	.08½	.12	.08½	.12	.08½	.12
Solid, 50 lb boxes.....lb.	.16	.18	.16	.18	.16	.18
Sticks .....ton	25.00	26.00	25.00	26.00	25.00	26.00
G Salt paste, 360 lb bbls...lb.	.45	.47	.45	.47	.42	.43
Gall Extract .....lb.	.18	.20	.18	.20	.18	.20
Gambier, com 200 lb bgs..lb.	...	.06	...	.06	.05	.08
Singapore cubes, 150 lb bgs .....100 lb.	.08	.09	.08	.09	.07½	.09½
Gelatin, tech, 100 lb cs ..lb.	.50	.55	.50	.55	.50	.55
Glauber's Salt, tech, c-l, wks .....100 lb.	1.10	1.30	1.10	1.30	1.10	1.30
Anhydrous, see Sodium Sulfate.						
Glucose (grape sugar) dry 70-80° bgs, c-l, NY ..100 lb.	3.24	3.34	3.24	3.34	3.24	3.34
Tanner's Special, 100 lb bgs .....100 lb.	...	2.33	...	2.33	...	2.33
Glue, bone, com grades, c-l bgs .....lb.	.10½	.17½	.10½	.17½	...	...
Better grades, c-l, bgs lb.	.12	.17½	.12	.17½	...	...
Casein, kgs .....lb.	.18	.22	.18	.22	.18	.22
Glycerin, CP, 550 lb drs ..lb.	.14½	.17	.16	.17	.14	.14½
Dynamite, 100 lb drs ...lb.	.14½	.14¼	.13¾	.14½	.13¾	.14¼
Saponification, drs .....lb.	.11¼	.11½	.10¼	.11½	.10	.11½
Soap Lye, drs .....lb.	.10¼	.09½	.09¼	.10¼	.09	.10

l + 10; *m* + 50.

	Current Market	1936 Low	1936 High	1935 Low	1935 High
Glyceryl Phthalate .....lb.	...	.28	...	.28	...	.28
Glyceryl Stearate, bbls....lb.	...	.18	...	.18	...	.18
Glycol Phthalate .....lb.	...	.35	.29	.35	.28	.29
Glycol Stearate .....lb.	...	.23	...	.23	.18	.23
Graphite:						
Crystalline, 500 lb bbls .....lb.	.04	.05	.04	.05	.04	.05
Flake, 500 lb. bbls .....lb.	.08	.16	.08	.16	.08	.16
Amorphous, bbls .....lb.	.03	.04	.03	.04	.03	.04
GUMS						
Gum Aloes, Barbadoes ....lb.	.85	.90	.85	.90	.85	.90
Arabic, amber sorts .....lb.	.09	.09½	.09	.10¾	.09½	.15
White sorts, No. 1, bgs .....lb.	.25	.27	.25	.27	.21	.27
No. 2, bgs .....lb.	.24	.26	.24	.26	.19	.26
Powd, bbls .....lb.	.13	.14	.13	.14	.13¼	.18
Asphaltum, Barbadoes (Manjak) 200 lb bgs, f.o.b., NY .....lb.	.02½	.10½	.02½	.10½	.02½	.10½
Egyptian, 200 lb cases, f.o.b., NY .....lb.	.12	.15	.12	.15	.12	.15
California, f.o.b., NY, drs .....ton	29.00	55.00	29.00	55.00	29.00	55.00
Benzoin Sumatra, USP, 120 lb cases .....lb.	.17	.19	.17	.19	.19	.28
Copal, Congo, 112 lb bgs, clean, opaque .....lb.	.18½	.19	.18½	.20	.19½	.24⅜
Dark amber .....lb.	.07¾	.08	.07½	.08	.07¼	.09¼
Light amber .....lb.	.13⅜	.14⅛	.13⅜	.14⅛	.11½	.14⅜
Copal, East India, 180 lb bgs						
Macassar pale bold ....lb.	.12⅝	.13¼	.12⅝	.14	.09½	.10¾
Chips .....lb.	.06⅛	.06½	.06⅛	.06½	.05½	.06
Nubs .....lb.	...	.11⅛	.10⅞	.11⅛	...	...
Dust .....lb.	.03⅝	.04⅛	.03⅝	.04⅛	.03⅝	.04½
Singapore						
Bold .....lb.	.15¾	.16¼	.16⅜	.16⅞	.12⅛	.17
Chips .....lb.	.04¾	.05¼	.04¾	.05¼	.04⅝	.05⅝
Nubs .....lb.	.10⅜	.11¼	.10⅜	.11¼	.10	.11¾
Dust .....lb.	.03⅜	.04⅛	.03⅜	.04⅛	.03⅜	.05½
Copal Manilla, 180-190 lb baskets, Loba A .....lb.	.12	.12½	.12	.13	.11¾	.13
Loba B .....lb.	.10¾	.11½	.10¾	.12	.10¼	.12
Loba C .....lb.	.09⅞	.10⅜	.09⅞	.11⅜	.10⅜	.11½
MA sorts .....lb.	.06⅞	.07⅜	.06⅞	.07⅜	.06	.07⅝
DBB .....lb.	.08	.08⅞	.08	.08⅞	.08	.09
Dust .....lb.	.05⅝	.06⅛	.05⅝	.06⅛	.04⅞	.06⅛
Copal Pontianak, 224 lb cases, bold genuine .....lb.	.14¼	.14¾	.14¼	.16	.14⅜	.16¾
Mixed .....lb.	.13¼	.13¾	.13¼	.13¾	.12⅞	.14⅞
Chips .....lb.	.07⅜	.07⅞	.07	.07⅞	.06⅞	.08¼
Nubs .....lb.	.10¼	.10½	.10¼	.10½	.09⅝	.11¾
Split .....lb.	.12⅞	.13	.12⅞	.13	.12¾	.13⅞
Dammar Batavia, 136 lb cases						
A .....lb.	.21¾	.22¼	.21⅜	.22¼	.19	.21⅞
B .....lb.	.20¾	.21½	.20⅜	.21½	.18	.20⅞
C .....lb.	...	.16⅝	.16½	.17⅝	.16	.17
D .....lb.	.14¼	.14⅜	.13⅝	.14⅜	.11¾	.14⅛
A/D .....lb.	.15¾	.17	.15½	.17	.14	.16
A/E .....lb.	.13⅞	.13⅝	.13⅛	.14¼	.11¾	.13¾
E .....lb.	.06¾	.07¼	.06¾	.07¼	.07	.07¼
F .....lb.	.06⅜	.06⅞	.06⅜	.06⅞	.06⅛	.06⅞
Singapore						
No. 1 .....lb.	.16¼	.16⅞	.16¼	.17½	.15⅝	.19
No. 2 .....lb.	.13¾	.14¼	.13¾	.14¼	.10⅝	.14⅞
No. 3 .....lb.	.05¼	.05¾	.05¼	.05¾	.04⅝	.05⅞
Chips .....lb.	...	.09¾	.09¾	.09¾	.08⅞	.09¾
Dust .....lb.	...	.05⅛	.05⅛	.05⅜	.04¾	.05⅞
Seeds .....lb.	...	.07⅜	.06⅝	.07⅜	.04¾	.07¼
Elemi, cons .....lb.	.09¾	.10¼	.09¾	.10¼	...	...
Ester .....lb.	.07⅝	.08⅜	.07⅝	.08¾	.07¼	.08⅜
Gamboge, pipe, cases .....lb.	.58	.59	.58	.59	.55	.65
Powd, bbls .....lb.	.65	.66	.65	.66	.65	.75
Ghatti, sol. bgs .....lb.	.11	.15	.11	.15	.09	.15
Karaya, powd, bbls, xxx..lb.	.24	.25	.24	.25	.23	.25
xx .....lb.	.16	.17	.16	.17	.15	.17
No. 1 .....lb.	.09½	.10	.09½	.10	.08	.10
No. 2 .....lb.	.08½	.09	.08½	.09	.07	.09
Kauri, NY, San Francisco, Brown XXX, cases ....lb.	.60	.60½	.60	.60½	.60	.60½
BX .....lb.	.33	.33½	.33	.33½	.33	.33½
B1 .....lb.	.19	.19½	.19	.19¼	.19	.19½
B2 .....lb.	.14½	.15	.14½	.15	.14½	.15
B3 .....lb.	.12	.12½	.12	.12½	.12	.12½
Pale XXX .....lb.	.65	.65½	.65	.65½	.65	.65½
No. 1 .....lb.	.40	.40½	.40	.40½	.40	.40½
No. 2 .....lb.	.22	.22½	.22	.22½	.22	.22½
No. 3 .....lb.	.15	.15½	.15	.15½	.15	.15½
Kino, tins .....lb.	.70	.80	.70	.80	.70	.80
Mastic .....lb.	.60	.60½	.60	.60½	.46	.60½
Sandarac, prime quality, 200 lb bgs & 300 lb cks ...lb.	.26¼	.26½	.26¼	.26½	.26¼	.35½
Senegal, picked bgs .....lb.	.20	.21	.20	.21	.20	.21
Sorts .....lb.	.11½	.12½	.11½	.12½	.09⅜	.12½
Thus, bbls .....280 lbs.	...	11.00	...	11.00	10.50	11.00
Strained .....280 lbs.	...	11.00	...	11.00	10.50	11.00
Tragacanth, No. 1, cases .....lb.	1.25	1.30	1.20	1.30	1.15	1.30
No. 2 .....lb.	1.15	1.20	1.10	1.20	1.05	1.20
No. 3 .....lb.	1.00	1.05	.95	1.05	.95	1.05
No. 4 .....lb.	.90	.95	.85	.95	.85	.95
No. 5 .....lb.	.80	.85	.75	.85	.75	.85
No. 6, bgs .....lb.	.21	.25	.18	.25	.14	.19
Sorts, bgs .....lb.	.30	.35	.25	.30	.11	.25
Yacca, bgs .....lb.	.03¼	.03¾	.03¼	.03¾	.03¼	.03¾



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METHYL CHLORIDE	FORMIC ACID

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MECHLING BROS. CHEMICAL COMPANY

PHILADELPHIA CAMDEN, N.J. BOSTON, MASS.

Helium
Meta-nitro-paratoluidine

Prices

	Current Market	1936 Low	1936 High	1935 Low	1935 High
Helium, cyl (200 cu. ft.) cyl.	... 25.00	... 25.00		... 25.00	
Hematite crystals, 400 lb bbls lb.	.16 .18	.16 .18		.16 .18	
Paste, 500 bbls .....lb.	... .11	... .11		... .11	
Hemlock, 25%, 600 lb bbls, wks .....lb.	... .02⅞	... .02⅞		... .02⅞	
tks .....lb.	... .02½	... .02½		... .02½	
Hexalene, 50 gal drs, wks lb.	... .30	... .30		... .30	
Hexane, normal 60-70°C. Group 3, tks .....gal.	... .12	... .12		... .14	
Hexamethylenetetramine, drs .....lb.	.37 .39	.37 .39		.37 .39	
Hexyl Acetate, delv, drs ..lb.	.12 .12½	.12 .12½		.12 .12½	
tks .....lb.	... .11½	... .11½		... .11½	
Hoof Meal, f.o.b. Chicago unit	2.40 2.50	2.35 2.50		2.50 2.70	
Hydrogen Peroxide, 100 vol, 140 lb cbys .....lb.	.20 .21	.20 .21		.20 .21	
Hydroxyamine Hydrochloride .....lb.	... 3.15	... 3.15		... 3.15	
Hypernic, 51°, 600 lb bbls lb.	.17 .20	.17 .20		.17 .20	
Indigo, Madras, bbls .....lb.	1.25 1.30	1.25 1.30		1.25 1.30	
20% paste, drs .....lb.	.15 .18	.15 .18		.15 .18	
Synthetic, liquid .....lb.	.13 .14	.13 .14		... .12	
Iodine, Resublimed, kgs...lb.	1.50 1.55	1.50 1.75		... 1.90	
Irish Moss, ord, bales ....lb.	.09 .10	.09 .10		.09 .10	
Bleached, prime, bales ..lb.	.18 .19	.18 .19		.18 .19	
Iron Acetate Liq. 17°, bbls lb.	.03 .04	.03 .04		.03 .04	
Chloride see Ferric Chloride.					
Nitrate, coml, bbls ..100 lb.	2.75 3.25	2.75 3.25		2.75 3.25	
Oxide, English .....lb.	.07½ 08¾	.07½ .08¾		.07½ .08¾	
Isobutyl Carbinol (128-132°C) drs, wks .....lb.	.33 .34	.33 .34		.33 .34	
tks, wks .....lb.	... .32	... .32		... .32	
Isopropyl Acetate, tks, frt allowed .....lb.	... .06	.06 .07½		... .07½	
drs, frt allowed .....lb.	.07 .07½	.07 .09		.08½ .09	
Ether, see Ether, isopropyl.					
Keiselguhr, 95 lb bgs, NY, Brown .....ton	60.00 70.00	60.00 70.00		60.00 70.00	
Lead Acetate, brown, broken, f.o.b. NY, bbls .....lb.	... .09½	... .09½		... .09½	
White, broken, bbls ..lb.	... .11	... .11		... .11	
cryst, bbls .....lb.	... .10½	... .10½		... .10½	
gran, bbls .....lb.	... .11	... .11		... .11	
powd, bbls .....lb.	... .11¼	... .11¼		... .11¼	
Arsenate, East, jobbers, drs .....lb.	.09 .09⅜	.09 .09⅜		.09 .09½	
Dealers, drs .....lb.	.09¼ .10¾	.09¼ .10¾		.09¼ .10¾	
West, jobbers, drs .....lb.	... .09	... .09		... .09	
dealers, drs .....lb.	... .10	... .10		... .10	
Linoleate, solid, bbls ...lb.	.26 .26½	.26 .26½		.26 .26½	
Metal, c-l, NY .....100 lb.	... 4.60	4.50 4.60		3.50 4.50	
Red, dry, 95% Pb_2O_4, delv .....lb.	.0735 ...	.07 .08		.06 .08	
97% Pb_2O_4, delv .... lb.	.0760 ...	.07¼ .08¼		.06¼ .08¼	
98% Pb_2O_4, delv .... lb.	... .0810	.07½ .08½		.06½ .08½	
Nitrate, 500 lb bbls, wks lb.	.09 .09½	.09 .09½		.10 .14	
Oleate, bbls .....lb.	.15 .16	.15 .16		.15 .16	
Resinate, precip, bbls ..lb.	... .14	... .14		... .14	
Stearate, bbls .....lb.	.22 .23	.22 .23		.22 .23	
White, 500 lb bbls, wks..lb.	.06½ .07	.06½ .07		.06½ .07	
Sulfate, 500 lb bbls, wks lb.	... .06	... .06		... .06	
Lime, chemical quicklime, f.o.b., wks, bulk .....ton	7.00 7.25	7.00 7.25		7.00 7.25	
Hydrated, f.o.b., wks ..ton	9.00 12.00	8.50 12.00		8.50 12.00	
Lime Salts, see Calcium Salts.					
Lime sulfur, dealers, tks..gal.	... .11	... .11		.10½ .11	
drs .....gal.	.13 .16	.13 .16		.13 .16½	
Dry, bgs, jobbers.....lb.	.07¼ .10¼	.07¼ .10¼		... ...	
Linseed Meal, bgs .....ton	... 29.50	29.00 30.00		25.50 40.00	
Litharge, coml, delv, bbls..lb.	.0610 .07	.06 .07		.05 .07	
Lithopone, dom, ordinary, delv, bgs .....lb.	.04½ .04¾	.04½ .04¾		.04½ .04¾	
bbls .....lb.	.04¾ .05	.04¾ .05		.04¾ .05	
High strength, bgs .....lb.	.06 .06¼	.06 .06¼		.06 .06¼	
bbls .....lb.	.06¼ .06½	.06¼ .06½		.06¼ .06½	
Titanated, bgs .....lb.	.06 .06¼	.06 .06¼		.06 .06¼	
bbls .....lb.	.06¼ .06½	.06¼ .06½		.06¼ .06½	
Logwood, 51°, 600 lb bbls lb.	.06½ .10¼	.06½ .10½		.08½ .10½	
Solid, 50 lb boxes .....lb.	.13½ .17½	.13½ .17½		.13½ .17½	
Sticks .....ton	24.00 26.00	24.00 26.00		24.00 26.00	
Madder, Dutch .....lb.	.22 .25	.22 .25		.22 .25	
Magnesite, calc, 500 lb bbl ton	60.00 65.00	60.00 65.00		60.00 65.00	
Magnesium Carb, tech, 70 lb bgs, wks .....lb.	.06 .06½	.06 .06½		.06 .06½	
Chloride flake, 375 lb drs, c-l, wks .....ton	36.00 39.00	36.00 39.00		36.00 39.00	
Magnesium fluosilicate, crys, 400 lb bbls, wks .....lb.	.10 .10½	.10 .10½		.10 .10½	
Oxide, USP, light, 100 lb bbls .....lb.	... .42	... .42		... .42	
Heavy, 250 lb bbls ..lb.	... .50	... .50		... .50	
Palmitate, bbls .....lb.	.23 .24	.23 .24		.22 .24	
Stearate, bbls .....lb.	.20 .22	.20 .22		.19 .22	
Linoleate, lig drs .....lb.	.18 .19	.18 .19		.18 .19	
Resinate, fused, bbls ...lb.	.08¼ .08½	.08¼ .08½		.08¼ .08½	
precip, bbls .....lb.	... .12	... .12		... .12	
Manganese Borate, 30%, 200 lb bbls .....lb.	.15 .16	.15 .16		.15 .16	
Chloride, 600 lb cks ....lb.	.09 .12	.09 .12		.09 .12	
Dioxide, tech (peroxide), paper bgs, c-l .....ton	... 47.50	... 47.50		45.00 50.00	
Mangrove, 55%, 400 lb bbls lb.	... .04	... .04		... .04	
Bark, African .....ton	26.50 27.00	26.00 27.00		26.00 30.00	
Marble Flour, blk .....ton	12.00 13.00	12.00 13.00		12.00 13.00	
Mercuric chloride .....lb.	.81 .83	.81 .83		.71 .93	
Mercury metal ...76 lb. flasks	75.50 76.00	75.50 80.00		69.00 77.00	
Meta-nitro-aniline .....lb.	.67 .69	.67 .69		.67 .69	
Meta-nitro-paratoluidine 200 lb bbls .....lb.	1.40 1.55	1.40 1.55		1.40 1.55	

Current

Meta-phenylene-diamine
Orthodichlorobenzene

	Current Market	1936 Low	1936 High	1935 Low	1935 High
Meta-phenylene-diamine 300 lb bbls ..... lb.	.80	.80	.84	.80	.84
Peroxide, 100 lb cs ..... lb.	1.20	1.20	1.25	1.20	1.25
Silicofluoride, bbls ..... lb.	.09	.09	.10	.09	.10
Stearate, bbls ..... lb.	.19	.19	.20	.19	.20
Meta-toluene-diamine, 300 lb bbls ..... lb.	.67	.67	.69	.67	.69
Methanol, 95%, frt allowed, drs ..... gal. *o*	.37½	.37½	.58	.37½	.58
tks, frt allowed .... gal. *o*	.33	.33	.36½	.33	.36½
97% frt allowed, drs gal. *o*	.38½	.38½	.59	.38½	.59
tks, frt allowed .... gal. *o*	.34	.34	.37½	.34	.37½
Pure, frt allowed, drs gal. *o*	.40	.40	.61	.40	.61
tks, frt allowed .... gal. *o*	.35½	.39	.35½	.39	.35½	.39
Synthetic, frt allowed, drs ..... gal. *o*	.40	.40	.61	.40	.61
tks, frt allowed .... gal. *o*	.35½	.39	.35½	.39	.35½	.39
Methyl Acetate, dom, 98-100%, drs ..... lb.	.16	.17½	.11	.18½	.18	.18½
Synthetic, 410 lb drs ... lb.	.16	.17	.16	.17	.16	.17
tks ..... lb.	...	.15	...	.15	...	.15
Acetone, frt allowed, drs ..... gal. *p*	.52½	.68½	.48½	.68½	.49½	.73½
tks, frt allowed, drs gal. *p*	...	.48	.44	.48	.44	.52½
Synthetic, frt allowed, east of Rocky M., drs gal. *p*	.57½	.60	.57½	.60	.57½	.60
tks, frt allowed.... gal.	...	.53	...	.53	...	.53
West of Rocky M., frt allowed, drs .... gal. *p*	.66	.69	.66	.69	.66	.69
tks, frt allowed .. gal. *p*	...	.63½	...	.63½	...	.63½
Hexyl Ketone, pure, drs lb.	...	.60	...	.60	.	.60
Anthraquinone ..... lb.	.65	.67	.65	.67	.65	.67
Butyl Ketone, tks ..... lb.	...	.10½	...	.10½	...	.10½
Chloride, 90 lb cyl ..... lb.	...	.45	...	.45	...	.45
Ethyl Ketone, tks ..... lb.	...	.07½	...	.07½	...	.07½
Propyl carbinol, drs .... lb.	.60	.75	.60	.75	.60	.75
Mica, dry grd, bgs, wks .. lb.	35.00	...	35.00	...	35.00	...
Michler's Ketone, kgs .... lb.	...	2.50	...	2.50	...	2.50
Molasses, blackstrap, tks, f.o.b. NY ..... gal.	.08	.08¼	.08	.08¼	.07¾	.08¼
Monoamylamine, drs, wks lb.	...	1.00	...	1.00	...	1.00
Monochlorobenzene, see Chlorobenzene, mono.						
Monoethanolamine, tks, wks lb.	...	.30	...	.30	...	...
Monomethylparaminosulfate, 100 lb drs ..... lb.	3.75	4.00	3.75	4.00	3.75	4.00
Myrobalans 25%, liq bbls.. lb.	...	.04¼	...	.04¼	...	.04¼
50% Solid, 50 lb boxes lb.	.06	.06¼	.06	.06¼	.06	.06¼
J1 bgs ..... ton	22.75	23.50	22.75	24.00	23.50	27.00
J2 bgs ..... ton	...	14.50	...	14.50	15.00	15.75
R2 bgs ..... ton	...	14.00	...	14.00	16.00	16.50
Naphtha, v.m.&p. (deodorized) see petroleum solvents.						
Naphtha, Solvent, water-white, tks ..... gal.	...	.31	...	.31	.26	.30
drs, c-l ..... gal.	...	.36	...	.36	.31	.35
Naphthalene, dom, crude, bgs, wks ..... lb.	4.00	nom.	3.50	4.00	1.65	3.00
Imported, cif, bgs .... lb.	...	...	...	...	1.90	3.00
Dyestuffs, bgs, bbls, Eastern wks ..... lb.	.06	.07	.06	.07	.04¼	.07
Balls, flakes, pks ..... lb.	...	.08	.07¼	.08	...	...
Balls, ref'd, bbls, Eastern wks ..... lb.	...	.07¼	.06¾	.07¼	.04½	.06¾
Flakes, ref'd, bbls, Eastern wks ..... lb.	...	.07¼	.06¾	.07¼	.04½	.06¾
Dyestuffs, bgs, bbls, Mid-West wks ..... lb. *q*	.06½	.07½	.06½	.07½	.04¾	.07½
Balls, ref'd, bbls, Mid-West wks ..... lb. *q*	...	.07¾	.07¼	.07¾	.05	.07½
Flakes, ref'd, bbls, Mid-West wks ..... lb. *q*	...	.07¾	.07¼	.07¾	.05	.07¼
Nickel Carbonate, bbls.... lb.	...	.36	...	.36	.35	.36
Chloride, bbls ..... lb.	.18	.19	.18	.19	.18	.19
Oxide, 100 lb kgs, NY.. lb	.35	.37	.35	.37	.35	.37
Salt, 400 lb bbls, NY ... lb.	.13	.13½	.13	.13½	.12½	.13½
Single, 400 lb bbls, NY lb.	.13	.13½	.13	.13½	.11½	.13½
Metal ingot ..... lb.	...	.35	...	.35	...	.35
Nicotine, free 50%, 8 lb tins, cases ..... lb.	8.25	10.15	8.25	10.15	8.25	10.15
Sulfate, 55 lb drs ..... lb.	.75	1.17	.75	1.17	.67	.80
Nitre Cake, blk ..... ton	12.00	14.00	12.00	14.00	12.00	14.00
Nitrobenzene, redistilled, 1000 lb drs, wks ..... lb.	.09	.11	.09	.11	.09	.11
tks ..... lb.	...	.08½	...	.08½	...	.08½
Nitrocellulose, c-l-l c-l, wks lb.	.29½	.34	.29½	.34	.27	.34
Nitrogenous Mat'l, bgs, imp unit	..	2.00	2.00	2.25	2.20	2.75
dom, Eastern wks .... unit	1.90	2.00	1.90	2.25	2.20	2.40
dom, Western wks .... unit	...	1.85	1.85	1.90	1.90	2.30
Nitronaphthalene, 550 lb bbls lb.	.24	.25	.24	.25	.24	.25
Nutgalls Aleppy, bgs ..... lb.	.16	.18	.16	.18	.12	.18
Chinese, bgs ..... lb.	.19	.20	.19	.20	.19	.20
Oak Bark Extract, 25%, bbls lb.	...	.03½	...	.03½	...	.03½
tks ..... lb.	...	.02¾	...	.02¾	...	.02¾
Octyl Acetate, tks, wks ... lb.	...	.15	...	.15	...	...
Orange-Mineral, 1100 lb cks NY ..... lb.	.10	.10½	.10	.10½	.09¼	.10½
Orthoaminophenol, 50 lb kgs. lb.	2.15	2.25	2.15	2.25	2.15	2.25
Orthoanisidine, 100 lb drs lb.	.82	.84	.82	.84	.82	.84
Orthochlorophenol, drs .... lb.	.50	.65	.50	.65	.50	.65
Orthocresol, drs ..... lb.	.13	.15	.13	.15	.13	.15
Orthodichlorobenzene, 1000 lb drs ..... lb.	.06½	.11½	.05½	.11½	.05½	.06

o Country is divided in 5 zones, prices varying by zone. In drum prices range covers both zone and c-l and lcl quantities in the 5 zones; in each case, bbl. prices are 2½c higher; synthetic is not shipped in bbls.; *p* Country is divided into 5 zones. Also see footnote directly above; *q* Naphthalene quoted on Pacific Coast F.A.S. Phila. or N. Y.

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Barium Hydrate

Prime White Crystals

BARIUM REDUCTION CORP.

SOUTH CHARLESTON, W. VA.

Orthonitrochlorobenzene
Phloroglucinol

Prices

	Current Market	1936 Low	1936 High	1935 Low	1935 High
Orthonitrochlorobenzene, 1200 lb drs, wks ..... lb.	.28	.28	.29	.28	.29
Orthonitrotoluene, 1000 lb drs, wks ..... lb.	.07	.07	.10	.05½	.10
Orthonitrophenol, 350 lb drs ..... lb.	.52	.52	.80	.52	.80
Orthotoluidine, 350 lb bbls, l-c-l ..... lb.	.14½	.14½	.15	.14½	.15
Orthonitroparachlorphenol, tins ..... lb.	.70	.70	.75	.70	.75
Osage Orange, cryst ..... lb.	.17	.17	.25	.17	.25
51 deg liquid ..... lb.	.07	.07	.07¾	.07	.07¾
Powd, 100 lb bgs ..... lb.	.14½	.14½	.15	.14½	.15
Paraffin, rfd, 200 lb cs slabs 122-127 deg M P ..... lb.	.0445	.0445	.04½	.04	.04¾
128-132 deg M P ..... lb.	.04¾	.04¾	.049	.05	.0515
133-137 deg M P ..... lb.	.05½	.05¾	.05¾	.0575	.06
Para aldehyde, 110-55 gal drs ..... lb.	.16	.16	.18	.16	.18
Aminoacetanilid, 100 lb kgs ..... lb.	...	...	.85	...	.85
Aminohydrochloride, 100 lb kgs ..... lb.	1.25	1.25	1.30	1.25	1.30
Aminophenol, 100 lb kgs lb.	...	...	1.05	...	1.05
Chlorophenol, drs ..... lb.	.50	.50	.65	.50	.65
Coumarone, 330 lb drs .. lb.	...	...	...	...	...
Cymene, refd, 110 gal dr ..... gal.	2.25	2.25	2.50	2.25	2.50
Dichlorobenzene, 150 lb bbls wks ..... lb.	.16	.16	.20	.16	.20
Formaldehyde, bbls, wks lb.	.38	.38	.39	.38	.39
Nitroacetanilid, 300 lb bbls ..... lb.	.45	.45	.52	.45	.52
Nitroaniline, 300 lb bbls, wks ..... lb.	.47	.47	.51	.48	.55
Nitrochlorobenzene, 1200 lb drs, wks ..... lb.	.23½	.23½	.24	.23½	.24
Nitro-orthotoluidine, 300 lb bbls ..... lb.	2.75	2.75	2.85	2.75	2.85
Nitrophenol, 185 lb bbls lb.	.45	.45	.50	.45	.50
Nitrosodimethylaniline, 120 lb bbls ..... lb.	.92	.92	.94	.92	.94
Nitrotoluene, 350 lb bbls lb.	.36	.36	.37	.35	.37
Phenylenedamine, 350 lb bbls ..... lb.	1.25	1.25	1.30	1.25	1.30
Para Tertiary amyl phenol, wks, drs ..... lb.	.32	.32	.50	.32	.50
Toluenesulfonamide, 175 lb bbls ..... lb.	.70	.70	.75	.70	.75
tks, wks ..... lb.	...	...	.31	...	.31
Toluenesulfonchloride, 410 lb bbls, wks ..... lb.	.20	.20	.22	.20	.22
Toluidine, 350 lb bbls, wks ..... lb.	.58	.58	.60	.56	.60
Paris Green, Arsenic Basis 100 lb kgs ..... lb.	...	...	.24	...	.24
250 lb kgs ..... lb.	...	...	.22	...	.22
Perchlorethylene, 50 gal drs ..... lb.	...	...	.15	...	.15
Persian Berry Ext, bbls .. lb.	.55	.55	Nom.	.55	Nom.
Pentane, normal, 28-38°C, group 3, tks..... gal.	...	...	.09	...	.09
drs, group 3 ..... gal.	.10	.10	.15	.10	.15
Petrolatum, dark amber, bbls ..... lb.	.02⅝	.02⅝	.02⅞	.02⅞	.02⅞
Light, bbls ..... lb.	.03⅛	.03⅛	.03⅛	.02½	.03⅛
Medium, bbls ..... lb.	.02⅞	.03⅛	.02⅞	.03⅛	.02¼
Dark green, bbls ..... lb.	.02½	.02¾	.02½	.02¾	.02½
White, lily, bbls ..... lb.	.06	.06¼	.06	.06¼	.05¼
White, snow, bbls ..... lb.	.07	.07¼	.07	.07¼	.06¼
Red, bbls ..... lb.	.02⅝	.02⅛	.02⅝	.02⅛	.02¼
Petroleum Ether, 30-60°, group 3, tks ..... gal.	...	.13	...	.13	...
drs, group 3 ..... gal.	.15	.16	.15	.16	.15

PETROLEUM SOLVENTS AND DILUENTS

Cleaners naphthas, group 3, tks, wks ..... gal.	.07⅜	.07½	.07⅜	.07½	.06⅞
Bayonne, tks, wks .. gal.	...	.09½	.09	.09½	...
West Coast, tks .... gal.	...	.15	...	.15	...
Hydrogenated, naphthas, frt allowed East, tks .... gal.	...	.16	...	.16	.15
No. 2, tks ..... gal.	...	.18	...	.18	.18
No. 3, tks ..... gal.	...	.15	...	.15	.15
No. 4, tks ..... gal.	...	.18	...	.18	.18
Lacquer diluents, tks Bayonne ..... gal.	.12	.12½	.12	.12½	.12
Group 3, tks ..... gal.	.08⅜	.08½	.08⅜	.08½	.07⅞
Naphtha, V.M.P., East, tks, wks ..... gal.	...	.09½	.09	.09½	...
Group 3, tks, wks ... gal.	.07⅜	.07½	.07⅜	.07½	.06⅞
Petroleum thinner, East, tks, wks ..... gal.	...	.09	.09	.09½	...
Group 3, tks, wks ... gal.	.06⅜	.06⅝	.06⅜	.06⅝	.05⅞
Rubber Solvents, stand grd, East, tks, wks ..... gal.	...	.09½	.09	.09½	...
Group 3, tks, wks .. gal.	.07⅜	.07½	.07⅜	.07½	.06⅞
Stoddard Solvent, East, tks, wks ..... gal.	...	.09½	.09	.09½	...
Group 3, tks, wks ... gal.	.06⅞	.07	.06⅞	.07	.06⅜
Phenol, 250-100 lb drs .... lb.	.14¼	.15	.14¼	.15	.14¼
Phenyl-Alpha-Naphthylamine, 100 lb kgs ..... lb.	...	1.35	...	1.35	...
Phenyl Chloride, drs ..... lb.	...	.16	...	.16	...
Phenylhydrazine Hydrochloride ..... lb.	2.90	3.00	2.90	3.00	2.90
Phloroglucinol, tech, tins .. lb.	15.00	16.50	15.00	16.50	15.00
CP, tins ..... lb.	20.00	22.00	20.00	22.00	20.00

	Current Market	1936 Low	1936 High	1935 Low	1935 High
Phosphate Rock, f.o.b. mines					
Florida Pebble, 68% basis ton	...	1.85	...	1.85	1.85	3.40
70% basis ton	...	2.35	...	2.35	2.35	3.90
72% basis ton	...	2.85	...	2.85	2.85	4.40
75-74% basis ton	...	3.85	...	3.85	3.85	5.40
75% basis ton	...	4.35	...	4.35	4.35	5.50
Tennessee, 72% basis ton	...	4.50	...	4.50	4.50	4.75
Phosphorous Oxychloride 175 lb cyl lb.	.16	.20	.16	.20	.16	.20
Red, 110 lb cases lb.	.44	.45	.44	.45	.44	.45
Yellow, 110 lb cs, wks lb.	.28	.33	.28	.33	.28	.33
Sesquisulfide, 100 lb cs lb.	.38	.44	.38	.44	.38	.44
Trichloride, cyl lb.	.16	.20	.16	.20	.16	.20
Phthalic Anhydride, 100 lb drs, wks lb.	.14½	.15½	.14½	.15½	.14½	.15½
Pine Oil, 55 gal drs or bbls						
Destructive dist lb.	.44	.46	.44	.46	.44	.50
Steam dist wat wh bbls gal.	.64	.65	.64	.65	.64	.65
tks gal.	...	.59	...	.59	...	.59
Straw color, bbls gal.	...	.59	...	.59	...	.59
tks gal.	...	.54	...	.54	...	.54
Pitch Hardwood, wks ton	...	15.00	...	15.00	15.00	20.00
Burgundy, dom, bbls, wks lb.	...	.03½	...	.03½	...	.03½
Imported lb.	.11	.13	.11	.13	.11	.13
Coaltar, bbls, wks ton	...	19.00	...	19.00	...	19.00
Petroleum, see Asphaltum in Gums' Section.						
Pine, bbls bbl.	4.00	4.50	4.00	4.50	3.75	4.25
Stearin, drs lb.	.03	.04½	.03	.04½	.03	.04½
Platinum, refd oz.	34.50	38.00	34.50	38.00	35.00	38.00

POTASH

Potash, Caustic, wks, sol lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
flake lb.	.07	.07⅜	.07	.07⅜	.07	.07⅜
Liquid, tks lb.	...	.02⅞	...	.02⅞	...	.02⅞
Potash Salts, Rough Kainit 14% basis ton	...	8.50	...	8.50	...	8.50
Manure Salts, imported						
20% basis, blk ton	...	11.00	...	11.00	8.60	11.00
30% basis, blk ton	...	14.40	...	14.40	12.90	14.40
Domestic, cif ports, blk unit	...	.43	...	.43	...	.43
Potassium Acetate lb.	.26	.28	.26	.28	.26	.28
Potassium Muriate, 80% basis bgs ton	...	22.50	...	22.50	22.00	22.50
Dom, blk unit	...	.45	...	.45	.40	.45
Pot & Mag Sulfate, 48% basis bgs ton	22.25	22.50	22.25	22.50	19.50	22.50
Potassium Sulfate, 90% basis bgs ton	...	33.75	...	33.75	33.75	35.00
Potassium Bicarbonate, USP 320 lb bbls lb.	.09	.18	.09	.18	.07½	.09
Bichromate Crystals, 725 lb cks lb.	.08½	.09	.08½	.09	.08⅛	.09
Binoxalate, 300 lb bbls lb.	...	.23	...	.23	.22	.23
Bisulfate, 100 lb kgs lb.	.15½	.18	.15½	.18	.35	.36
Carbonate, 80-85% calc 800 lb cks lb.	.07¼	.07½	.07¼	.07½	.07½	.07⅞
liquid, tks lb.	...	.02⅞	...	.02⅞	...	...
drs, wks lb.	.03⅛	.03¼	.03⅛	.03¼	...	...
Chlorate crys, 112 lb kgs, wks lb.	.09¼	.09½	.09¼	.09½	...	.09¾
gran, kgs lb.	.12	.13	.12	.13	.12	.13
powd, kgs lb.	.08	.08¼	.08	.08¼	.08¾	.09¼
Chloride, crys, bbls lb.	.04	.04¾	.04	.04¾	.04	.04¾
Chromate, kgs lb.	.23	.28	.23	.28	.23	.28
Cyanide, 110 lb cases lb.	.55	.57½	.55	.57½	.55	.57½
Iodide, 75 lb bbls lb.	1.10	1.15	1.10	1.25	1.25	1.40
Metabisulfite, 300 lb bbls lb.	..	.15	...	.15	...	.15
Oxalate, bbls lb.	.25	.26	.25	.26	.16	.24
Perchlorate, cks, wks lb.	.09	.11	.09	.11	.09	.11
Permanganate, USP, crys, 500 & 1000 lb drs, wks lb.	.18½	.19½	.18½	.19½	.18½	.19½
Prussiate, red, 112 lb kgs lb.	.35	.38½	.35	.38½	.35	.38½
Yellow, 500 lb casks lb.	.18	.19	.18	.19	.18	.19
Tartrate Neut, 100 lb kgs lb.	...	.21	...	.21	...	.21
Titanium Oxalate, 200 lb bbls lb.	.32	.35	.32	.35	.32	.35
Propane, group 3, tks lb.	...	.03	...	.03	...	.07
Pumice Stone, lump bgs lb.	.04½	.06	.04½	.06	.04½	.06
250 lb bbls lb.	.05	.07	.05	.07	.05	.07
Powd, 350 lb bgs lb.	.02½	.03	.02½	.03	.02½	.03
Putty, coml, tubs 100 lb.	...	2.75	...	2.75	...	2.75
Linseed Oil, kgs 100 lb.	...	4.50	...	4.50	...	4.50
Pyridine, 50 gal drs gal.	...	1.30	...	1.30	1.20	1.30
Pyrites, Spanish cif Atlantic ports, blk unit	.12	.13	.12	.13	.12	.13
Pyrocatechin, CP, drs, tins lb.	2.40	2.75	2.40	2.75	2.40	3.00
Quebracho, 35% liq tks lb.	...	.02⅝	...	.02⅝	...	.02⅝
450 lb bbls, c-l lb.	...	.03½	.03⅛	.03½	...	.03⅛
Solid, 63%, 100 lb bales cif lb.	...	.03⅝	...	.03⅝	...	.03⅝
Clarified, 64%, bales lb.	...	.03⅞	...	.03⅞	...	.03⅞
Quercitron, 51 deg liq, 450 lb bbls lb.	.06	.06½	.06	.06½	.06	.06½
Solid, 100 lb boxes lb.	.10	.12	.10	.12	.10	.12
R Salt, 250 lb bbls, wks lb.	.52	.57	.52	.57	.44	.45
Resorcinol tech, cans lb.	.75	.80	.75	.80	.75	.80
Rochelle Salt, cryst lb.	.14	.14½	.14	.14½	.14	.15
Powd, bbls lb.	.13	.13½	.13	.13½	.13	.13½
Rosin Oil, bbls, first run gal.	.42	.44	.41	.44	.36	.45
Second run gal.	.48	.50	.47	.50	.43	.48
Third run, drs gal.	.55	.57	.54	.57	.50	.60

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Rosins
Sodium Nitrate

Prices

		Current Market	1936 Low	1936 High	1935 Low	1935 High
Rosins 600 lb bbls, 280 lb unit ex. yard NY:						
B	...	4.65	4.45	4.65	4.65	5.65
D	...	5.25	4.95	5.25	5.02½	5.75
E	...	5.25	5.15	5.30	5.15	5.90
F	...	5.50	5.40	5.60	5.20	5.95
G	...	5.55	5.50	5.75	5.25	6.00
H	...	5.55	5.55	5.85	5.25	6.00
I	...	5.60	5.60	5.85	5.25	6.00
K	...	5.65	5.70	6.00	5.27½	6.05
M	...	5.65	5.60	5.95	5.35	6.10
N	...	5.75	5.70	6.02½	5.75	6.40
WG	...	5.80	5.85	6.35	5.95	6.87½
WW	...	5.90	5.90	6.90	6.25	7.55
Rosins, Gum, Savannah (280 lb unit):						
B	...	3.50	3.15	3.50	3.40	4.40
D	...	4.10	3.75	4.10	3.70	4.50
E	...	4.10	3.90	4.10	3.90	4.65
F	...	4.30	4.10	4.36	3.95	4.70
G	...	4.30	4.20	4.45	4.00	4.75
H	...	4.30	4.30	4.60	4.00	4.75
I	...	4.35	4.30	4.60	4.00	4.75
K	...	4.40	4.35	4.65	4.02½	4.80
M	...	4.45	4.35	4.70	4.10	4.85
N	...	4.50	4.45	4.80	4.50	5.15
WG	...	4.50	4.45	5.10	4.70	5.60
WW	...	4.55	4.55	5.65	5.15	6.25
X	...	4.55	4.55	5.65	5.20	6.25
Rosins, Wood, wks (280 lb unit), wks, FF	...	4.30	4.40	4.30	4.05	6.35
I	...	4.45	4.45	4.70	4.30	7.00
M	...	4.55	4.55	5.10	4.55	7.25
N	...	4.95	4.95	5.75	5.00	7.75
Rosin, Wood. c-l, FF grade, NY	...	5.02	6.10	6.10	4.92	5.62
Rotten Stone, bgs mines..ton	...	35.00	...	35.00	23.50	35.00
Lump, imported, bbls ...lb.	.05	.07	.05	.07	.05	.07
Selected, bbls. .....lb.	.08	.10	.08	.10	.08	.10
Powdered, bbls .....lb.	.02½	.05	.02½	.05	.02½	.05
Sago Flour, 150 lb bgs ....lb.	.02¾	.03¾	.02¾	.03¾	.02¾	.03¾
Sal Soda, bbls, wks ...100 lb.	...	1.15	1.15	1.30	..	1.30
Salt Cake, 94-96%, c-l, wks ton	19.00	23.00	19.00	23.00	13.00	18.00
Chrome, c-l, wks .....ton	11.00	12.00	11.00	13.00	12.00	13.00
Saltpetre, double refd, gran, 450-500 lb bbls .....lb.	.059	.06¼	.059	.06¼	.059	.06¼
Powd, bbls .....lb.	.069	.07⅞	.069	.07⅞	.069	.07⅞
Cryst, bbls .....lb.	.069	.08	.069	.08	.069	.08
Satin, White, 550 lb bbls..lb.	...	.01½	..	.01½	...	.01½
Shellac, Bone dry, bbls..lb. *r*	.19	.20	.19	.26½	.19	.32
Garnet, bgs .....lb.	.16	.17	.16	.20	.17	.27
Superfine, bgs .....lb. *s*	.15½	.17	.15½	.18	.16	.28
T. N., bgs .....lb. *s*	.14½	.15½	.14	.16	.13	.25
Schaeffer's Salt, kgs .....lb.	.48	.50	.48	.50	.48	.50
Silver Nitrate, vials .....oz.	...	.32⅜	.32 5/16	.32⅝	.36⅜	.53¼
Slate Flour, bgs, wks ....ton	9.00	10.00	9.00	10.00	9.00	10.00
Soda Ash, 58% dense, bgs, c-l, wks .....100 lb.	...	1.25	...	1.25	...	1.25
58% light, bgs .....100 lb.	...	1.23	...	1.23	...	1.23
blk .....100 lb.	...	1.05	...	1.05	...	1.05
paper bgs .....100 lb.	...	1.20	...	1.20	...	1.20
bbls .....100 lb.	...	1.50	...	1.50	...	1.50
Soda Caustic, 76% grnd & flake, drs .....100 lb.	...	3.00	...	3.00	...	3.00
76% solid, drs .....100 lb.	...	2.60	...	2.60	...	2.60
Liquid sellers, tks, 100 lbs.	...	2.25	...	2.25	...	2.25
Sodium Abietate, drs .....lb.	...	.08	...	.08	...	.08
Acetate, tech, 450 lb bbls, wks .....lb.	.04½	.05	.04½	.05	.04½	.05
Alignate, drs .....lb.	...	.64	..	.64	...	.64
Antimoniate, bbls .....lb.	.12¼	.12¾	.12¼	.14	...	...
Arsenate, drs .....lb.	...	.10½	...	.10½	...	.10½
Arsenite, liq, drs .....gal.	.40	.75	.40	.75	.40	.75
Benzoate, USP, kgs ....lb.	.46	.48	.46	.48	.46	.48
Bicarb. 400 lb bbl, wks 100 lb.	...	1.85	...	1.85	..	1.85
Bichromate, 500 lb cks, wks .....lb.	.06½	.07	.06½	.07	.06⅛	.07
Bisulfite, 500 lb bbl, wks lb.	.03¼	.036	.03¼	.036	.03¼	.036
35-40% sol cbys, wks 100 lb.	1.95	2.10	1.95	2.10	1.95	2.10
Chlorate, bgs, wks .....lb.	.06¼	.07½	.06¼	.07½	.06¼	.07½
Chloride, tech .....ton	13.60	16.50	13.60	16.50	13.60	16.50
Cyanide, 96-98%, 100 & 250 lb drs, wks .....lb.	.15½	.17½	.15½	.17½	.15½	.17½
Fluoride, 90%, 300 lb bbls, wks .....lb.	.07½	.08¼	.07¼	.08¼	.07¼	.08¼
Hydrosulfite, 200 lb bbls, f.o.b. wks .....lb.	.18	.19	.18	.19	.18	.21
Hyposulfite, tech, pea crys 375 lb bbls, wks 100 lb.	2.50	3.00	2.50	3.00	2.50	3.00
Tech. reg cryst, 375 lb bbls, wks .....100 lb.	2.40	2.75	2.40	2.75	2.40	2.75
Iodide .....lb.	1.90	1.95	1.90	2.05	2.00	2.40
Metanilate, 150 lb bbls..lb.	.41	.42	.41	.42	.41	.42
Metasilicate, gran, c-l, wks .....100 lb.	2.30	3.00	2.30	3.00	2.65	3.05
cryst, bbls, wks ..100 lb.	...	2.90	2.90	3.25	...	3.25
Monohydrate, bbls .....lb.	...	.023	...	.023	...	.02½
Napthenate, drs .....lb.	...	.09	...	.09	...	.09
Naphthionate, 300 lb bbl lb.	.52	.54	.52	.54	.52	.54
Nitrate, 92%, crude, 200 lb bgs, c-l, NY .....ton	...	25.80	24.80	25.80	...	24.80
100 lb bgs .....ton	...	26.50	25.50	26.50	...	25.50
Bulk .....ton	...	24.50	23.50	24.50	..	23.50

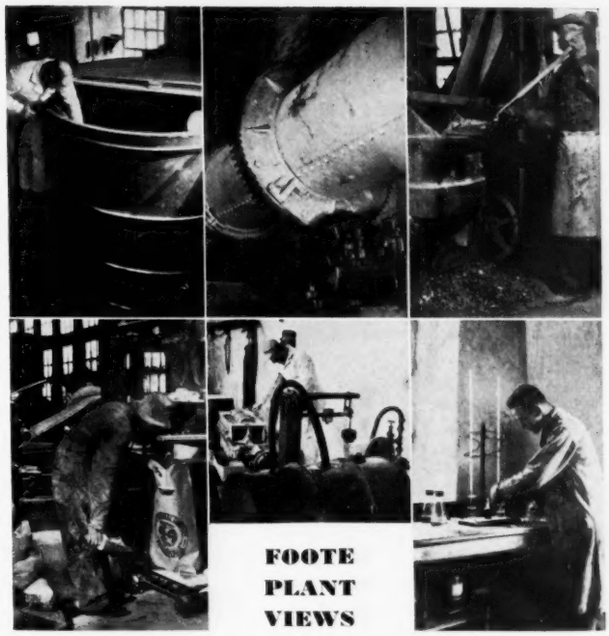
r Bone dry prices at Chicago 1c higher; Boston ½c; Pacific Coast 3c; Philadelphia deliveries f.o.b. N. Y.; refined 6c higher in each case; *s* T. N. and Superfine prices quoted f.o.b. N. Y. and Boston; Chicago prices 1c higher; Pacific Coast 3c; Philadelphia f.o.b. N. Y.

Current

Sodium Nitrite
Thiocarbanilid

	Current Market	1936 Low	1936 High	1935 Low	1935 High
Sodium (continued):					
Nitrite, 500 lb bbls .....lb.	.0710	.08	.0710	.08	.07¼ .08
Orthochlorotoluene, sulfonate, 175 lb bbls, wks..lb.	.25	.27	.25	.27	.25 .27
Perborate, 275 lb bbls ..lb.	.17	.18	.17	.18	.17 .19
Peroxide, bbls, 400 lb ..lb.	...	.17	...	.17	... .17
Phosphate, di-sodium, tech, 310 lb bbls, wks 100 lb.	...	2.10	2.10	2.30	2.20 2.30
bgs, wks .....100 lb.	...	1.90	1.90	2.10	2.00 2.10
tri-sodium, tech, 325 lb bbls, delv .....100 lb.	...	2.20	2.20	2.30	2.30 2.70
bgs, delv .....100 lb.	...	2.00	2.00	2.10	2.10 2.60
Picramate, 160 lb kgs ..lb.	.67	.69	.67	.69	.67 .69
Prussiate, Yellow, 350 lb bbl, wks .....lb.	.11½	.12	.11½	.12	.11½ .12
Pyrophosphate, anhyd, 100 lb bbls .....lb.	.102	.132	.102	.132	.102 .15
Silicate, 60°, 55 gal drs, wks .....100 lb.	1.65	1.70	1.65	1.70	1.65 1.70
40°, 35 gal drs, wks 100 lb.	...	.80	...	.80	... .80
tks, wks .....100 lb.	...	.65	...	.65	... .65
Silicofluoride, 450 lb bbls NY .....lb.	.06	.06¼	.05¼	.06¼	.04¼ .05
Stannate, 100 lb drs ....lb.	.31	.34	.31	.34	.31 .38
Stearate, bbls .....lb.	.22	.26	.21	.26	.20 .25
Sulfanilate, 400 lb bbls..lb.	.16	.18	.16	.18	.16 .18
Sulfate Anhyd, 550 lb bbls c-l, wks .....100 lb. †	1.30	1.55	1.30	1.55	1.25 2.35
Sulfide, 80% cryst, 440 lb bbls, wks .....lb.	...	.02¼	...	.02¼	... .02¼
62% solid, 650 lb drs, c-l, wks .....lb.	...	.03	...	.03	... .03
Sulfite, cryst, 400 lb bbls, wks .....lb.	.023	.02½	.023	.02½	.023 .02½
Sulfocyanide, bbls ..... lb.	.28	.47	.28	.47	.32 .42½
Tungstate, tech, crys, kgs lb.	.85	.90	.85	.90	... .90
Spruce Extract, ord, tks...lb.	...	.01	...	.01	... .01
Ordinary, bbls .....lb.	...	.01½	...	.01½	... .01½
Super spruce ext, tks....lb.	...	.01⅝	...	.01⅝	... .01⅝
Super spruce ext, bbls...lb.	...	.01⅞	...	.01⅞	... .01⅞
Super spruce ext, powd, bgs .....lb.	...	.04	...	.04	... .04
Starch, Pearl, 140 lb bgs .....100 lb.	3.19	3.39	2.99	3.39	3.13 3.78
Powd, 140 lb bgs....100 lb.	3.29	3.49	3.09	3.49	3.23 3.66
Potato, 200 lb bgs.....lb.	.04½	.05½	.04½	.05½	.04½ .06
Imp, bgs .....lb.	.05¾	.06	.05¾	.06	.05¾ .06½
Rice, 200 lb bbls .....lb.	...	.07¼	...	.07¼	.07¼ .08½
Wheat, thick, bgs .....lb.	...	.08¼	...	.08¼	... .08¼
Strontium carbonate, 600 lb bbls, wks .....lb.	.07¼	.07½	.07¼	.07½	.07¼ .07½
Nitrate, 600 lb bbls, NY lb.	.08¾	.09½	.08¾	.09½	.08¾ .09½
Sucrose octa-acetate, den, grd, bbls, wks .....lb.	.45	...	.45	...	... ...
tech, bbls, wks .....lb.	.40	...	.40	...	... ...
Sulfur	...	...	...	...	... ...
Crude, f.o.b. mines ....ton	18.00	19.00	18.00	19.00	18.00 19.00
Flour, coml, bgs ....100 lb.	1.60	2.35	1.60	2.35	1.60 2.35
bbls .....100 lb.	1.95	2.70	1.95	2.70	1.95 2.70
Rubbermakers, bgs ..100 lb.	2.20	2.80	2.20	2.80	2.20 2.80
bbls .....100 lb.	2.55	3.15	2.55	3.15	2.55 3.15
Extra fine, bgs .....100 lb.	2.40	3.00	2.40	3.00	2.40 3.00
Superfine, bgs .....100 lb.	2.20	2.80	2.20	2.80	2.20 2.80
bbls .....100 lb.	2.25	3.10	2.25	3.10	2.25 3.10
Flowers, bgs .....100 lb.	3.00	3.75	3.00	3.75	3.00 3.75
bbls .....100 lb.	3.35	4.10	3.35	4.10	3.35 4.10
Roll, bgs .....100 lb.	2.35	3.10	2.35	3.10	2.35 3.10
bbls .....100 lb.	2.50	3.25	2.50	3.25	2.50 3.25
Sulfur Chloride, red, 700 lb drs, wks .....lb.	.05	.05½	.05	.05½	.05 .05½
Yellow, 700 lb drs, wks lb.	.03½	.04½	.03½	.04½	.03½ .04½
Sulfur Dioxide, 150 lb cyl lb.	.06½	.08½	.06½	.08½	.08½ .10
Multiple units, wks ....lb.	.05½	.06	.05½	.06	... .06½
tks, wks .....lb.	.04½	.04¾	.04½	.04¾	... .04¾
Refrigeration, cyl, wks .. lb.	.10	.13	.10	.13	... .13
Multiple units, wks .....lb.	.07	.09¼	.07	.09¼	... .09¼
Sulfuryl Chloride .....lb.	.15	.40	.15	.40	.15 .40
Sumac, Italian, grd .....ton	...	60.00	52.00	60.00	50.00 65.00
dom, bgs, wks .....ton	...	35.00	...	35.00	... 35.00
Superphosphate, 16% bulk, wks .....ton	8.25	Nom.	8.25	Nom.	8.25 8.50
Run of pile .....ton	7.75	Nom.	7.75	Nom.	7.75 8.00
Talc, Crude, 100 lb bgs, NY .....ton	14.00	15.00	14.00	15.00	14.00 15.00
Refd, 100 lb bgs, NY ton	16.00	18.00	16.00	18.00	16.00 18.00
French, 220 lb bgs, NY ton	23.00	30.00	22.00	30.00	22.00 30.00
Refd, white, bgs .....ton	45.00	60.00	45.00	60.00	45.00 60.00
Italian, 220 lb bgs to arr ton	70.00	75.00	70.00	75.00	70.00 75.00
Refd, white, bgs, NY ton	75.00	80.00	75.00	80.00	75.00 80.00
Tankage Grd, NY ....unit ¤	...	2.65	2.65	3.10	2.35 3.00
Ungrd .....unit ¤	...	2.40	2.40	2.75	2.15 2.50
Fert grade, f.o.b. Chicago .....unit ¤	...	2.40	2.40	2.75	2.25 2.65
South American cif..unit ¤	...	2.70	2.70	3.15	2.45 3.15
Tapioca Flour, high grade, bgs .....lb.	.03½	.05½	.03½	.05½	.0215 .05
Tar Acid Oil, 15%, drs ..gal.	.22½	.23½	.22½	.23½	.21 .23½
25%, drs .....gal.	.24½	.26½	.24½	.26½	.23 .26½
Tar, pine, delv, drs .....gal.	...	.26	.25	.26	.25 .26
tks, delv .....gal.	...	.20	...	.20	... .20
Tartar Emetic, tech .....lb.	.24¾	.25	.24¾	.25	.22¾ .25
USP, bbls .....lb.	.28	.28½	.28	.28½	.28 .28½
Terpineol, den grd, drs ...lb.	.13¾	.14¾	.13¾	.14¾	.13¾ .14¾
tks .....lb.	.13	.14	.13	.14	.13 .14
Tetrachlorethane, 50 gal drs lb.	.08	.08½	.08	.08½	.08½ .09
Tetralene, 50 gal drs, wks lb.	.12	.13	.12	.13	.12 .13
Thiocarbanilid, 170 lb bbl..lb.	.20	.25	.20	.25	.20 .25

† Bags 15c lower; ¤ + 10.



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Rochester, N. Y.

Tin Crystals
Zinc Stearate

Prices

		Current Market	1936 Low	1936 High	1935 Low	1935 High
Tin, crystals, 500 lb bbls, wks	lb.	.35	.35½	.35	.37½	.36	.39½
Metal, NY	lb.	...	.47	.47	.48⅞	.456	.52½
Oxide, 300 lb bbls, wks	lb.	.51	.53	.51	.53	.51	.58
Tetrachloride, 100 lb drs, wks	lb.	...	.23½	.23½	.24¾	.24¾	.26¾
Titanium Dioxide, 300 lb bbls	lb.	.17¼	.19¾	.17¼	.19¼	.17¼	.19¼
Barium Pigment, bbls	lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
Calcium Pigment, bbls	lb.	.06¼	.06½	.06¼	.06½	.06¼	.06½
Toluol, 110 gal drs, wks	gal.	...	.35	...	.35	...	.35
8000 gal tks, frt allowed	gal.	...	.30	...	.30	...	.30
Toluidine, mixed, 900 lb drs, wks	lb.	.27	.28	.27	.28	.27	.28
Toner Lithol, red, bbls	lb.	.75	.80	.75	.80	.75	.80
Para, red, bbls	lb.	...	.75	...	.75	...	.75
Toluidine, bgs	lb.	...	1.35	...	1.35	...	1.35
Triacetin, 50 gal drs, wks	lb.	.32	.36	.32	.36	.32	.36
Triamylamine, drs, wks	lb.	...	1.25	...	1.25	...	1.25
Trichlorethylene, drs, frt allowed	lb.	.089	.094	.089	.094	.09½	.10
Triethanolamine, 50 gal drs wks	lb.	.26	.30	.26	.30	.26	.38
tks, wks	lb.	...	.25	...	.25	...	...
Tricresyl Phosphate, drs	lb.	.19	.26	.19	.26	.21	.23
Triphenyl Guanidine	lb.	.58	.60	.58	.60	.58	.60
Tripoli, airfloated, bgs, wks	ton	27.50	30.00	27.50	30.00	27.50	30.00
Tungsten, Wolframite per unit		15.00	15.25	15.00	15.25	15.00	15.25
Turpentine (Spirits), c-l, NY dock, bbls	gal.	...	.40½	.40½	.50	.43¾	.55½
Savannah, bbls	gal.	...	.35¾	.35¾	.45	.38¾	.50¼
Jacksonville, bbls	gal.	...	.35¼	.35¼	.44½	.38¾	.50¼
Wood Steam dist, bbls, c-l, NY	gal.	...	.38	.38	.47	.43	.50
Urea, pure, 112 lb cases	lb.	.14½	.15½	.14½	.17	.15½	.17
Fert grade, bgs. c.i.f. c.i.f. S.A. points	ton	95.00	110.00	95.00	110.00	100.00	120.00
Urea, dom, f.o.b., wks	ton	95.00	110.00	95.00	110.00	...	...
Urea Ammonia liq 55% NH_3, tks	unit	...	.96	...	.96	...	.96
Valonia beard, 42%, tannin bgs	ton	...	64.50	60.00	64.50	40.00	58.00
Cups, 32% tannin, bgs	ton	...	Nom.	...	Nom.	26.00	49.00
Mixture, bark, bgs	ton	...	Nom.	...	Nom.	...	32.00
Vanilin, ex eugenol, 100 lb tins	lb.	...	3.75	...	3.75	...	...
Ex-guaiacol	lb.	...	3.65	...	3.65	...	...
Vermillion, English, kgs	lb.	1.59	1.61	1.58	1.79	1.48	1.71
Vinyl Chloride, 16 lb cyl	lb.	...	1.00	...	1.00	...	1.00
Wattle Bark, bgs	ton	27.00	29.00	27.00	29.75	29.00	32.00
Extract, 60°, tks, bbls	lb.	...	.03⅝	...	.03⅝	...	.03¾

WAXES

Wax, Bayberry, bgs	lb.	.17½	.20	.17½	.20	.17½	.23
Bees, bleached, white 500 lb slabs, cases	lb.	.36	.38	.34	.38	.33½	.34
Yellow, African, bgs	lb.	.25	.26½	.24	.26½	.21	.25½
Brazilian, bgs	lb.	.26	.28	.25	.28	.21½	.26½
Chilean, bgs	lb.	.26	.28	.25	.28	.21½	.26½
Refined, 500 lb slabs, cases	lb.	.28	.30	.28	.30	.27½	.28
Candelilla, bgs	lb.	.15½	.16	.15½	.17½	.10	.17½
Carnauba, No. 1, yellow, bgs	lb.	.45	.46½	.45	.48	.35	.54
No. 2, yellow, bgs	lb.	.44	.45	.44	.46	.34	.51
No. 2, N. C., bgs	lb.	.40	.41	.40	.41	.26½	.43½
No. 3, Chalky, bgs	lb.	.34½	.35	.34½	.38	.21	.42½
No. 3, N. C., bgs	lb.	.34½	.37	.34½	.41	.22½	.43
Ceresin, white, imp, bgs	lb.	.43	.45	.43	.45	.43	.45
Yellow, bgs	lb.	.36	.38	.36	.38	.36	.38
Domestic, bgs	lb.	.08	.11	.08	.11	.08	.11
Japan, 224 lb cases	lb.	.08¼	.08¾	.08	.08¾	.06	.09
Montan, crude, bgs	lb.	.10¾	.11¾	.10¾	.11¾	.10½	.11¾
Paraffin, see Paraffin Wax.							
Spermaceti, blocks, cases	lb.	.22	.24	.22	.24	.19	.24
Cakes, cases	lb.	.23	.25	.23	.25	.20	.25
Whiting, prec 200 lb bgs, c-l, wks	ton	...	15.00	...	15.00	12.00	15.00
Alba, bgs, c-l, wks	ton	...	15.00	...	15.00	...	15.00
Gliders, bgs, c-l, wks	ton	11.50	14.50	11.50	15.00	...	15.00
Wood Flour, c-l, bgs	ton	18.00	30.00	18.00	30.00	18.00	30.00
Xylol, frt allowed, East 10° tks, wks	gal.	...	.33	...	.33	.27	.33
Coml, tks, wks, frt allowed	gal.	...	.30	...	.30	.26	.30
Xylidine, mixed crude, drs	lb.	.36	.37	.36	.37	.36	.37
Zinc, Carbonate tech, bbls, NY	lb.	.09½	.11	.09½	.11	.09½	.11
Chloride fused, 600 lb drs, wks	lb.	.04½	.05¾	.04½	.05¾	.04½	.05¾
Gran, 500 lb bbls, wks	lb.	.05	.05¾	.05	.05¾	.05	.05¾
Soln 50%, tks, wks	100 lb.	...	2.00	...	2.00	...	2.00
Cyanade, 100 lb drs	lb.	.36	.38	.36	.38	.36	.41
Zinc Dust, 500 lb bbls, c-l, delv	lb.	...	.069	.0685	.069	.057	.0685
Metal, high grade slabs, c-l, NY	100 lb.	...	5.275	5.22	5.275	4.05	5.22½
E. St. Louis	100 lb.	...	4.90	4.85	4.90	3.70	4.85
Oxide, Amer, bgs, wks	lb.	.05	.05½	.05	.05½	.05	.06¼
French, 300 lb bbls, wks	lb.	.05½	.07	.05½	.07	.05½	.10⅞
Palmitate, bbls	lb.	.22	.23	.22	.23	.21	.23
Perborate, 100 lb drs	lb.	...	1.25	...	1.25	...	1.25
Peroxide, 100 lb drs	lb.	...	1.25	...	1.25	...	1.25
Resinate, fused, dark, bbls	lb.	.09	.10	.05¾	.10	.05¾	.06½
Stearate, 50 lb bbls	lb.	.19	.22	.19	.22	.18	.22

	Current Market		1936 Low	1936 High	1935 Low	1935 High
Zinc Sulfate, crys, 400 lb bbl, wks ..... lb.	.028	.033	.028	.033	.028	.033
Flake, bbls ..... lb.	.032	.035	.032	.035	.032	.035
Sulfide, 500 lb bbls, delv lb.	.10¾	.11¾	.10¾	.11¾	.10¾	.11¾
bgs, delv ..... lb.	.10½	.11½	.10½	.11½	.10½	.11½
Sulfocarbolate, 100 lb kgs ..... lb.	.24	.25	.24	.25	.24	.25
Zirconium Oxide, Nat kgs lb.	.02¼	.03	.02½	.03	.02¼	.03
Pure, kgs ..... lb.	.45	.50	.45	.50	.45	.50
Semi-refined, kgs ..... lb.	.08	.10	.08	.10	.08	.10

Oils and Fats

Castor, No. 3, 400 lb bbls.. lb.	.10¼	.10¾	.10¼	.10¾	.09¾	.10¾
Blown, 400 lb bbls ..... lb.	.12¼	.13	.12¼	.13	.11½	.16
China Wood, bbls spot NY lb.	.18½	.19	.14	.19¼	.094	.40
Tks, spot NY ..... lb.	.18	.1820	.13¾	.19	.088	.35
Coast, tks ..... lb.	.18	nom.	.132	.18	.087	.24
Coconut, edible, bbls NY.. lb.	...	.09¼	.09¼	.10¼	.04	.12
Manila, tks, NY ..... lb.	...	.04⅛	.04⅛	.05	.03¾	.06¼
Tks, Pacific Coast .... lb.	.03⅞	.04	.03⅞	.04⅞	.03⅜	.06
Cod, Newfoundland, 50 gal bbls ..... gal.	...	.40	...	.40	.34	.38
Copra, bgs, NY ..... lb.	.024	.025	.023	.0290	.02	.038
Corn, crude, tks, mills .... lb.	.08	.08⅛	.08	.09½	.08¾	.11
Refd, 375 lb bbls, NY .. lb.	.10¾	.11	.10¾	.12¾	.11½	.14
Cottonseed, see Oils and Fats News Section.						
Degras, American, 50 gal bbls, NY ..... lb.	.05¼	.06¾	.05¼	.06¾	.04½	.06
English, bbls, NY..... lb.	.08¾	.10¼	.08¾	.10¼	.04¾	.06½
Greases, Yellow ..... lb.	.03⅜	.03½	.03⅜	.05½	.05	.06¾
White, choice bbls, NY lb.	.04⅛	.05¾	.04⅛	.07¾	.05¼	.08½
Herring, Coast, tks ..... gal.	...	nom.	...	nom.	.23	.33
Lard Oil, edible, prime .. lb.	...	.12¾	.12¾	.14½	.09¾	.20½
Extra, bbls ..... lb.	...	.09½	.09½	.11	.08½	.11¾
Extra, No. 1, bbls ..... lb.	...	.07¾	.07¾	.09	.08¼	.11
Linseed, Raw, less than 5 bbl lots ..... lb.	...	.106	.102	.108	.091	.1130
bbls, c-l, spot ..... lb.	.092	.095	.092	.10	.083	.102
Tks ..... lb.	.086	.088	.086	.094	.0770	.096
Menhaden, tks, Baltimore gal.	.32	.33	.32	.36	.25	.36
Refined, alkali, drs ..... lb.	.066	.07	.066	.082	.061	.082
Tks ..... lb.	...	.062	.062	.072	.055	.072
Light pressed, drs ..... lb.	.06	.062	.06	.076	.055	.076
Tks ..... lb.	...	.056	.056	.066	.049	.066
Kettle bodied, drs ..... lb.	...	.08	.08	.096	...	...
Neatsfoot, CT, 20° bbls, NY ..... lb.	.16	.16¼	.16	.16¾	.16¼	.16¾
Extra, bbls, NY ..... lb.	...	.08	.08	.09¼	.08½	.11¼
Pure, bbls, NY ..... lb.	...	.11½	.11½	.12¾	.11¾	.13¼
Oleo, No. 1, bbls, NY .... lb.	...	.09½	.09½	.12½	.10¾	.14½
No. 2, bbls, NY ..... lb.	...	.09	.09	.12	.10	.13¾
Olive, denat, bbls, NY ...gal.	.74	.75	.73	.80	.82	.95
Edible, bbls, NY ..... gal.	1.60	1.90	1.60	1.90	1.55	1.90
Foots, bbls, NY ..... lb.	.08	.08½	.08	.08¾	.07⅛	.10
Oticica, bbls ..... lb.	.14¼	.15	.11	.15½	.13½	.28
Palm, Kernel, bulk ..... lb.	...	.049	.04¾	.049	...	...
Niger, cks ..... lb.	.0435	.04½	.0435	.05	.034	.05¾
Sumatra, tks ..... lb.	.03¾	.04	.03¾	.04	...	...
Peanut, crude, bbls, NY .. lb.	...	.08	.08	.09¼	...	...
Tks, f.o.b. mill ..... lb.	.07¾	.08	.07¾	.09⅛	.08¾	.10¾
Refined, bbls, NY ..... lb.	.12	.12¼	.12	.13¼	.12½	.14
Perilla, drs, NY ..... lb.	.07¼	.07¾	.07	.07¾	.07¼	.10¼
Tks, Coast ..... lb.	.069	.07	.066	.074	.068	.08½
Pine, see Pine Oil, Chemical Section.						
Rapeseed, blown, bbls, NY lb.	.086	.088	.086	.088	.07½	.09
Denatured, drs, NY ...gal.	.52	.52½	.52	.56	.40	.56
Red, Distilled, bbls ..... lb.	.08⅝	.09⅝	.08⅝	.10⅝	.07⅜	.10⅝
Tks ..... lb.	...	.07¾	.07¾	.08¾	.06½	.08¾
Salmon, Coast, 8000 gal tks ..... gal.	...	.31	...	.31	.25	.35
Sardine, Pac Coast, tks ..gal.	.28	nom.	.28	.39	.24½	.37½
Refined alkali, drs ..... lb.	.066	.068	.066	.082	.065	.082
Tks ..... lb.	...	.062	.062	.072	.06	.072
Light pressed, drs ..... lb.	.06	.062	.06	.076	.055	.076
Tks ..... lb.	...	.056	.056	.066	.049	.066
Sesame, yellow, dom ..... lb.	.12¾	.13½	.12¾	.14½	.12¼	.15½
White, dos ..... lb.	.12¾	.13¼	.12¾	.14½	.12¾	.15½
Soy Bean, crude						
Dom, tks, f.o.b. mills .. lb.	...	.07	.07	.085	.08	.10
Crude, drs, NY ..... lb.	.076	.08	.076	.095	.086	.11
Refd, bbls, NY ..... lb.	.081	.09	.081	.105	.091	.115
Tks ..... lb.	.07½	.08	.07½	.095	.08	.10½
Sperm, 38° CT, bleached, bbls NY ..... lb.	.094	.096	.094	.101	.099	.101
45° CT, bleached, bbls, NY ..... lb.	.087	.089	.087	.094	.092	.094
Stearic Acid, double pressed dist bgs ..... lb.	.08½	.09½	.08½	.11	.10	.12¼
Double pressed saponified bgs ..... lb.	.09	.10	.09	.11½	.09	.12¼
Triple pressed dist bgs..lb.	.11½	.12	.11½	.13¾	.12¾	.15¼
Stearine, Oleo, bbls ..... lb.	.07¼	.07½	.07¼	.09	.09¼	.12½
Tallow City, extra loose ..lb.	...	.04⅛	.04⅛	.06⅝	.05⅜	.07⅜
Edible, tierces ..... lb.	...	.06½	.06½	.08½	.07¼	.09¼
Acidless, tks, NY ..... lb.	...	.07	.07	.08¾	.07½	.10¾
Turkey Red, single, bbls ..lb.	.08	.08½	.08	.08½	.07½	.08½
Double, bbls ..... lb.	.12½	.13	.12½	.13½	.12½	.13½
Whale:						
Winter bleach, bbls, NY lb.	.078	.08	.077	.081	.07	.083
Refined, nat, bbls, NY ..lb.	.074	.076	.073	.076	.064	.081

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THE CHEMICAL MARKET-PLACE

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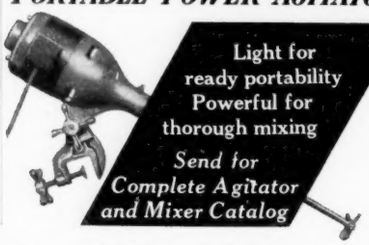

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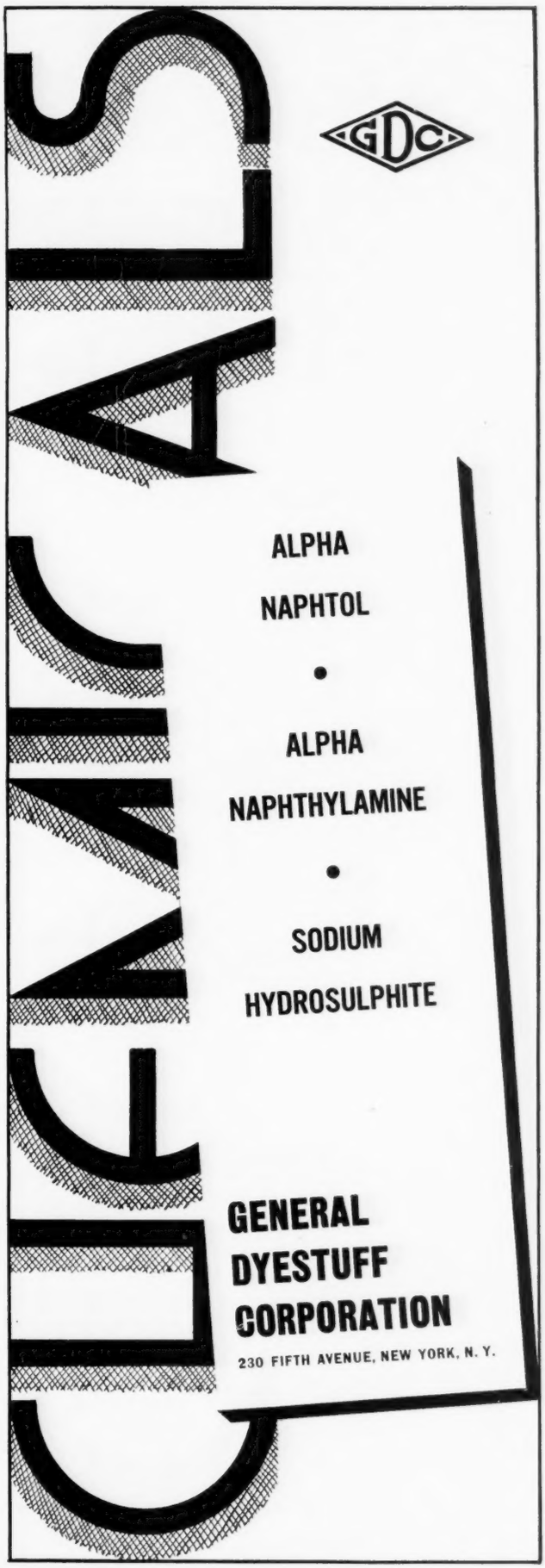

"We"—Editorially Speaking

Did you know that—

Commercial aluminum was made possible by Charles M. Hall and Paul Heroult who made the same discovery, at the same age, in the same year (1886)—Hall in the U. S. and Heroult in France. Both died in the same year—1914.

❖❖❖❖

A chemist of naturally retiring disposition was recently introduced for the first time to the first tee at the Wilmington Country Club. Before a generous gallery he swung a clean whiff.

"My Gawd!" he exclaimed, "this is the hell of a tough course."

❖❖❖❖

Overheard at Sea View—

"Why if all the chemical salesmen were laid end to end—" "Say, that isn't such a bad idea."

"Sartorially speaking, our new president is a big improvement."

"We ought to send Sandy Brown to the next Olympic diving contest."

"What is this 'schnapper' anyway?" "I dunno, but I guess it's a coal-tar perfume ingredient."

"Say, is it true that Doc Dorland is making a collection of first editions of Joe Miller?"

"When he was on the Coast last month Elon Hooker took $500 worth of golf lessons from Alec Morrison." "Huh, sorter gilding the lily, eh?"

"What does Charlie Mace mean?" "Mace? Why mace is the hard, outer shell of a nutmeg."

"That noisy enthusiast Mr. Bell escorted out of the dinner doesn't belong to the chemical industry at all, but he has a son working for Calco." "Filial detachment, eh?"

❖❖❖❖

William B. Spooner, Jr., author "Specially Designed Equipment," is an industrial engineering consultant on processing equipment, development and sales promotion. He has had considerable experience in technical editorial work on chemical plant practice, industrial air conditioning and heating, and his partner, Philip Kriegel, says he can write more words in shorter time on more subjects than anyone he knows. "He got that way, I guess, from several years' service as superintendent and research engineer, trying to pull uranium out of uranite and tungsten out of wolframite." His consuming desire is to play the part of the Bishop in "The Bishop Misbehaves." From all we hear, he would do a swell piece of acting.

❖❖❖❖

E. W. Eweson, who contributed the interesting article "Yeast from Wood" to this issue, is a versatile young man who came to this country from Sweden and associated himself with the advertising business. After this he went into the manufacture of picture frames by a special process of his own, which aside from being a profitable venture is also his hobby.

❖❖❖❖

Arthur Cahill, of Chas. L. Read & Co., N. Y. City naval stores dealer, has a long distance record that fades Canada's great Papa Dionne. Latest addition to the Cahill family is twins, bringing the grand total to eight boys and seven girls.

❖❖❖❖

Dr. C. L. Mantell, author of "The Natural Gums and Resins as Chemical Raw Materials," this issue, is Professor of Chemical Technology at Pratt Institute.

❖❖❖❖

A year ago "We" said editorially and we want to repeat it today with added emphasis that—

"Throughout the world, a new conception of the fundamental purpose of any economic system has been slowly growing, and today we witness a score of experiments seeking how that new purpose may be accomplished. The common characteristic of these experiments is a substitution of individualism for private profit by some form of collectivism for the common good. Private capitalism is challenged and merely to point to the tremendous raise in the standard of living accomplished during the past century or to prophesy the disastrous collapse of any socialized industrialism will not stop the political wrecking of the present economic system. The real threat is that collectivism makes the welfare of the masses, not the by-product, but the sole aim of all economic activity. We can answer only by proving in capitalism a sense of public responsibility at once economic and social."

❖❖❖❖

"We" doff our hat to the postman! An envelope addressed

John Winthrop, Jr.
25 Spruce Street
New York City

labelled by the postman "Not found" eventually found its way to our offices.

❖❖❖❖

Speaking of linseed oil, the market reporter of one of our esteemed daily newspapers on May 9 said:

"Deliveries against contracts for linseed oil are reported to be about up to schedule. In some instances consumers are behind but in others they are ahead so that on the average they are about even or slightly behind. Meanwhile the price situation is unchanged with 8.6c apparently the best that can be done first hand with rumors of resale oil at 8½c."

Just sorter going round-n-round as 'twere.

Fifteen Years Ago

From our issues of June, 1921

Adrian Joyce elected president Glidden Co.

By-Products Coke Corp. offers for sale $4,000,000 in bonds at 99 and interest, yielding 8.10 per cent.

A. G. Bruinier becomes New York sales executive of Tower Mfg. Co.

Geo. Mann & Co., incorporated at Providence, R. I., capital 250 shares, no par value, to manufacture chemicals and chemical by-products.

Henry Ford rumored considering purchase of three of the plants of government nitrate works at Sheffield, Ala.

Shareholders of Aetna Explosives Co. approve merger with Hercules Powder.

International Nickel moves New York offices to 67 Wall St.

Glenn L. Haskell appointed general Western sales manager U. S. I.

Mme. Curie awarded Willard Gibbs medal.